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U.S. DEPARTMENT OF AGRICULTURE

THE PLANT DISEASE REPORTER

Issued By

THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

AGRICULTURAL RESEARCH ADMINISTRATION

UNITED STATES DEPARTMENT OF AGRICULTURE

1951 SUMMARY OF RESULTS OF FUNGICIDE TESTS IN THE UNITED STATES AND CANADA

Supplement 213

August 15, 1952



The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

PLANT DISEASE REPORTER SUPPLEMENT

Issued by

THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station

Beltsville, Maryland

1951 SUMMARY OF RESULTS OF FUNGICIDE TESTS
IN THE UNITED STATES AND CANADA

Compiled by
The Fungicide Committee of the American Phytopathological Society:
Sub-Committee on Testing and Results of Newer Fungicides

Plant Disease Reporter
Supplement 213

August 15, 1952

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1951 SUMMARY OF RESULTS OF FUNGICIDE TESTS
IN THE UNITED STATES AND CANADA

The sub-committee on testing newer fungicides, of the fungicide committee of the American Phytopathological Society, after being dissolved in December, 1950, was later revived by fiat, re-constituted somewhat and instructed to prepare another report on 1951 results. Dr. Paul Miller again generously offered the Plant Disease Reporter as a publications medium. The committee is grateful to him and to the many contributors who have sent in their 1951 data from Canada and the States.

So many new materials have been tested since the last lists were published in Plant Disease Reporter Supplement 192, 1950, and 210, 1952, that a new one has been made up which we hope may be helpful.

Members of the sub-committee compiling this report were:

A. W. Dimock, Cornell University, Ithaca, New York
 J. M. Hamilton, New York State Agricultural Experiment Station, Geneva, New York
 Bert Lear, Cornell University, Ithaca, New York
 W. D. Mills, Cornell University, Ithaca, New York
 R. E. Wilkinson, Cornell University, Ithaca, New York
 A. G. Newhall, Cornell University, Ithaca, New York

VEGETABLES -- SMALL FRUITS -- FIELD AND
FORAGE CROPS AND ORNAMENTALS

State	Cooperators	Location of tests
Canada	H. N. Racicot	Ottawa
	K. M. Graham	Ottawa
	J. B. Julien	Ottawa
	J. K. Richardson	St. Catharines
	K. A. Harrison	Kentville, N. S.
	C. A. Gamley	Kentville, N. S.
	L. C. Callbeck	Charlottetown, P.E.I.
Alabama	J. A. Lyle	Auburn
		Ashford
California	J. T. Middleton	Riverside
	J. B. Kendrick, Jr.	Riverside
	P. A. Miller	Los Angeles
Colorado	G. E. Lane	(Eaton
	C. A. Schaal	(Yampa
	W. D. Thomas, Jr.	(Rocky Ford
		(Ft. Lupton
Connecticut	P. J. Anderson	Windsor
Delaware	J. W. Heuberger	Selbyville
Florida	R. R. Kincaid	Quincy
	R. A. Conover	(Belle Glade
	J. M. Walter	(Bradenton
		(Ft. Pierce
		(Homestead
		(Sanford
Illinois	Benjamin Koehler	Urbana
	J. W. Gerdemann	Urbana
Louisiana	E. C. Tims	Baton Rouge
	E. H. Floyd	Baton Rouge

State	Cooperators	Location of tests
Ohio	J. D. Wilson	Willard Wooster
South Carolina	O. L. Holdeman C. H. Arndt	Florence Clemson
South Dakota	L. T. Richardson A. A. Cook	Brookings
West Virginia	M. E. Gallegly	Huttonsville

FUNGICIDES USED ON VEGETABLES AND ORNAMENTALS -- 1951

Aagrano -- ethyl mercury bromide 3.5%, Mathieson Chem. Corp.
 Agrox -- phenyl mercury urea 6.7%, Chipman Chem. Co.
 C & C 1217 -- copper chromate complex, Carbide & Carbon
 C & H copper oxide -- mixture of cuprous and cupric oxide, 75% metallic copper, Calumet & Hecla Consol. Copper Co.
 Cadminate -- cadmium succinate, Mallinckrodt
 Calo-clor -- mercuric chloride-mercurous chloride, Mallinckrodt
 Calo-cure -- (?), Mallinckrodt
 Compound 1189 -- a chlorinated hydrocarbon (50%), General Chemical Co.
 CHCO -- a cuprous-cupric oxide complex (75-25%) containing 75% copper
 Cop-O-Zinc -- basic salts of copper and zinc
 Copper Cupferron -- a copper phenylhydroxylamine
 Crag 658 -- copper-zinc-chromate (30% copper - 20% zinc)
 Crag 1025 -- (?), Carbide & Carbon
 Dow 1003 -- 20% disodium 1,2-propylene dithiocarbamate, Dow
 Goodrite Zac -- zinc dimethyl dithiocarbamate-cyclohexyl amine, Goodrich
 HL 525 -- California Spray Chemical Corp.
 Iscothan -- 15% dinitro capryl phenyl crotonate, Innis, Speiden Co.
 Manzate)
 Mn EDB) -- manganese ethylene bis dithiocarbamate, DuPont
 Manganese carbamate)
 Mathieson 916 -- (?), Mathieson Chem.
 Methasan -- zinc dimethyl dithiocarbamate, Monsanto
 N-84 --
 NP 492 -- Pennsylvania Salt Mfg. Co.
 Nutri-leaf -- 16-16-16 foliar fertilizer containing minor elements and hormones, Miller Chem. Co., Baltimore
 Orthocide 406 -- N-trichloromethylthiotetrahydrophthalamide, California Spray Chemical Corp.
 OS 377C -- Shell
 OS 377D -- heptadecyl-trimethyl-tetrahydropyrimidine, Shell
 Ovotran -- p-chlorophenyl p-chlorobenzene sulfonate, Dow
 Phygon XL -- 2,3-dichloro-1,4-naphthoquinone (50%), U. S. Rubber Co.
 PMAS -- Cleary Corp.
 Puratized Agricultural Spray -- phenyl triethanol ammonium lactate, Gallowhur
 Puraturf 177 -- phenyl amino cadmium dilactate, Gallowhur
 Robertson's Fungicide -- copper oxide coating of a copper core
 SDDC-A -- a sodium dimethyl dithiocarbamate-cyclohexylamine
 SDDC -- 20% sodium dimethyl dithiocarbamate
 Sperguson SL -- tetrachloro-para-benzoquinone (95%), U. S. Rubber Co.
 Sulfenone -- p-chlorophenyl phenyl sulfone, Stauffer
 XP 50 -- Shell
 4255 -- Pittsburg Agr. Chem.
 4268T -- an organic arsenical 7.7%, Geary Chem. Corp.
 5379 -- 1,2,3-Trithio-5,8 diazacyclononane-4,9 dithione (75% active), Carbide & Carbon

Chem. Corp.

5400 -- organic cyclic compound of sulfur and nitrogen, Carbide & Carbon

FUNGICIDE EVALUATION STUDIES -- 1951

CANTALOUPE

MACROSPORIUM LEAF SPOT

Field plots: Power spray (and dust where indicated) 6 applications July 3-August 8; Variety Hales Best. Delaware -- J. W. Heuberg-er.

Order of Disease Control: (1) Bordeaux (6-3-100); (2) Dithane Z-78 (2-100), Tribasic (3-100); (3) Dithane Z-78 first 4 applications followed by Bordeaux on last 2; (4) Parzate (2-100); (5) Manzate (1.5-100); (6) Tribasic (Dust, 7% Cu); (7) Zerlate (2-100); (8) Zerlate (Dust, 10%); (9) Dithane Z-78 (Dust, 6%).

Yield: (1) Dithane Z-78; (2) Parzate; (3) Tribasic (Dust); (4) Dithane Z-78-Bordeaux split schedule; (5) Manzate; (6) Bordeaux; (7) Tribasic; (8) Zerlate; (9) Zerlate (Dust); (10) Dithane Z-78 (Dust).

CELERY

EARLY AND LATE BLIGHTS: Cercospora apii and Septoria apii

Field plots, variety Salt Lake, power sprayer 300 lbs., weekly applications August 15 to September 24. St. Catharines, Ontario, Canada, by J. K. Richardson.

Order of Disease Control: (1) Bay Car (an arsenical thiocarbamate) at 2-100, (2) Basicop 5-100 and Bordeaux 10-5-100, (3) ?, (4) Orthocide 2-100, (5) Ferbam 2-100 and Dow F 1003 at 2 qts. + 1 lb. ZnSO₄ to 100 (= Thiodow?), (6) ?, (7) Robertson Cu 1 1/2-100 and Mn Eth Bis 2-100 (Manzate ?).

No injury from any, no yield records.

CORN

1. SEED ROT AND SEEDLING BLIGHT:

Slurry seed treatments, field plots, varieties U. S. 13 and Ill. 972. Urbana, Illinois, by Benjamin Koehler.

In Order of Yield: (1) Arasan SF 1/2 oz. per bu. and 1 oz. per bu., Carb. & Carb. 5400 at 1 oz., (2) C & C 5400 at 1/2 oz., Phygon at 1/2 oz., and Spergon SL + DDT at 1 oz., (3) Spergon SL + DDT at 1/2 oz.

Both pre- and post-emergence benefits were notable as spring temperatures were cool. Ratings on stand were very similar to yield ratings above.

2. SEED AND SOIL-BORNE ROT:

Dust seed treatments, small plots, variety

Golden Bantam. Auburn, Alabama, by James A. Lyle.

In order of disease control and of plant safety and over-all preference same: (1) Agrox at 2 oz./bu., (2) Spergon at 3 oz./100 lbs., (3) Arasan at 2 oz./100 lbs., (4) Check, (5) Aagrano at 2 oz./bu.

3. NORTHERN LEAF BLIGHT: Helminthosporium turcicum Pass.

Power spraying, field plots, 3- to 7-day schedule. Belle Glade, Sanford, and Bradenton, also Homestead and Ft. Pierce, Florida, by Robert A. Conover and James M. Walter.

Order of disease control except at Homestead: (1) zineb 2 lbs./100 gals. and nabam + ZnSO₄ 2 qt. -3/4-100., (2) Orthocide 4 lbs.

Order of Safety: (1) zineb, (2) nabam + ZnSO₄, (3) Orthocide.

Order of Preference: (1) zineb and nabam.

At Homestead -- Order of disease control: (1) zineb 2 lbs., (2) ziram 2 lbs. or ferbam 2 lbs. or Puratized Agr. Spray 1 pt., (3) Phygon XL 3/4 lb.

Order of Safety: (1) zineb, or ziram, or ferbam, (2) Phygon or Puratized.

Over-all Preference: (1) zineb or nabam + ZnSO₄.

Notes: Orthocide not worth further trial. Zineb, ziram, ferbam and Phygon XL incompatible with DDT emulsion. Phygon XL and Puratized too injurious at Homestead.

COTTON

DAMPING-OFF: Colletotrichum gossypii and Rhizoctonia solani

A. Approximate maximum non-toxic dosages of certain fungicides on seeds when incorporated with pelleting materials such as feldspar, vermiculite, and Methocel sticker. Clemson, South Carolina -- C. H. Arndt

Ceresan M 0.3%, Dow 9B 0.3%, Phygon 0.5%, Arasan 3%, Zerlate 3%, Dithane Z-78 3%, Crag 5400 3%, pentachloronitrobenzene 3%, Orthocide 5%, Spergon 5%, Crag 531 5%.

Orthocide and Crag 5400 deserve further testing in pelleting method.

B. Approximate maximum non-toxic dosages when mixed with upper 2-3 cm. of soil containing 80 percent of its field moisture capacity previous to sowing acid delinted cotton seed.

Dowicide F. 4 lbs./acre, Vancide 51 50

lbs./acre, Crag 640 160 lbs./acre, Arasan and Crag 5400 100 lbs./acre, Orthocide, Crag 531, Dithane Z-78, and pentachloronitrobenzene 200 lbs./acre. Worthy of further testing when applied to furrow while seeding are Arasan, Orthocide, and pentachloronitrobenzene.

CUCUMBER

POWDERY MILDEW

Field plots: Hand duster, 3 applications at 2-week intervals; Variety Marketer. California -- John Middletown and J. B. Kendrick, Jr.

Order of Disease Control: (1) Iscothan; (2) Ovotran; (3) Cu-S; (4) sulfur; (5) zineb; (6) Sulfenone; (7) N-84 (all dust at 10% material).

Slight injury from Ovotran.

No Yield Data:

Over-all Preference: Iscothan.

DOWNY MILDEW

Field plots: Power sprayer (and hand duster), 5-day schedules; Variety Early Green Market. Florida -- George Swank, Jr.

Order of Disease Control: (1) Manzate (1 1/2-100), Dithane D-14 + ZnSO₄ (2-1-100), Parzate + ZnSO₄ (2-1-100); (2) Z. A. C. (3-100); (3) ziram (2-100), ferbam (2-100).

Plant Safety: All about equal.

No Yield Data:

Over-all Preference: Same order as disease control.

Dust applications at five-day intervals did not control Downy Mildew with following materials: Mathieson 916 (10%), Dithane Z-78 (6%), SR 406 (5%), ziram (10%), Tribasic (5%), ferbam (10%).

Plant Safety: 377B phytotoxic; Mathieson 916 slightly phytotoxic.

ANTHRACNOSE AND DOWNY MILDEW

Field plots; hand duster, 8 applications at 5-day intervals; Variety Palmetto (fall crop). South Carolina -- W. M. Epps.

Order of Anthracnose Control: (1) Manzate (6%); (2) SR 406 (5%), HL 525 (5%), Dithane (3.9%), Zerlate (6.1%), Parzate (3.9%); (3) Pittsburg 4255, C. & C. 5379; (4) NP 492, Tribasic.

Order of Downy Mildew Control: (1) Manzate; (2) Dithane, Parzate, Tribasic; (3) SR 406, HL 525, Zerlate, 4255, 5379, NP 492.

Yield: (1) Manzate, SR 406, (2) HL 525, Dithane, Zerlate, NP 492; (3) Parzate, Tribasic; (4) 4255, 5379.

No apparent injury from any material.

Over-all Preference: (1) Manzate; (2) Dithane, Parzate.

Note: 4255, 5379, NP 492, and Tribasic not worthy of further trial.

ANTHRACNOSE

Field plots: hand duster, 4-day schedule; Variety Marketer. Louisiana -- N. L. Horn and J. G. Atkins.

Order of Disease Control: (1) Dithane Z-78 (8% and 6%), Parzate (8%), Orthocide 406 (8%), Fermate (8%); (2) Crag 658 (8%); (3) Tribasic (7% Cu); (4) NP 492 (8%).

Plant Safety: (1) Dithane Z-78 (8% and 6%), Orthocide 406, NP 492; (2) Fermate, Parzate; (3) Crag 658, Tribasic.

Yield: (1) Dithane Z-78 (8%); (2) Dithane Z-78 (6%), Parzate, Orthocide 406, Fermate; (3) Crag 658; (4) Tribasic, (5) NP 492.

Over-all Preference: (1) Dithane Z-78 (8%); (2) Parzate, Orthocide 406, Fermate; (3) Crag 658, Tribasic; (4) NP 492.

Note: NP 492, Crag 658 and Tribasic are not considered worthy of further trial for control of Anthracnose.

ONION

MILDEW and THRIPS: Peronospora destructor and Thrips tabaci

Small plots, sprayed at weekly intervals February 20 to May 2, with knapsack hand sprayer. At Baton Rouge, Louisiana, by E. C. Tims and E. H. Floyd.

No mildew but heavy thrips development.

Compared Dithane Z-78 with and without DDT and Cop-O-Zinc with and without DDT.

Noted "Dithane-DDT plots looked much better and leaves stayed green longer, and yielded at 5075 lbs./acre while Cop-O-Zinc plots were no better than checks and checks gave yield of 3912 lbs./acre."

PURPLE BLOTCH: Alternaria porri

Field, power-sprayed, 125 g. p. a., 5 applications at 10-day intervals. At Rocky Ford and Ft. Lupton, Colorado, by W. D. Thomas, Jr.

Order of Disease Control: (1) OS-377D at 2 lbs., (2) Dithane Z-78 at 2 lbs. or Parzate 2 lbs. or Yellow Cuprocide at 2 lbs., (3) Cu A Comp. at 4 lbs. or Tribasic CuSO₄ at 4 lbs., (4) Manzate at 2 lbs., (5) Puratized Apple Spray at 2 lbs.

All equally safe except Puratized.

In Order of Yields: (1) Manzate, (2) OS-377D or Dithane or Parzate, (3) Yellow Cuprocide, (4) Cu A Comp. or Tribasic, (5) Puratized.

Over-all Preference: (1) Os-377D, Dithane, Parzate, (2) Yellow Cuprocide, Cu A Comp., Tribasic, (3) Manzate, (4) Puratized.

PEANUT

SEED AND SOIL-BORNE DISEASES

Dust Seed Treatments: small plots, pre- and post-emergence disease control. Auburn, Alabama -- by J. A. Lyle

In Order of Preference: (1) Agrox 1 oz./bu., (2) Agrox 2 oz./bu., (3) Aagrano 1 oz./bu. or Arasan 3 oz./100 lb., (4) Arasan 2 oz./100 lb. or C & C 5400 at 2 oz./100 or 4268-T at 5 oz./100, (5) C & C 5400 at 1 oz./100 or 4268-T at 10 oz./100, (6) Spergon 2 oz./100 or at 3 oz./100, (7) Check or Aagrano at 2 oz./bu.

PEAS

SEED DECAY AND DAMPING-OFF

Field and Greenhouse Temperature Tanks (14-16°C): Dust and slurry; Variety Wisconsin Perfection. Wisconsin -- D. J. Hagedorn.

Order of Disease Control: (1) KF 467 at 1 2/3 oz./100 lb., Phygon XL at 2 and 4 lbs./gal.; (2) Spergon SL at 4 lbs./gal.; (3) Arasan at 2 oz./100 lb.; Spergon at 3 oz./100 lb.; (4) Arasan SF at 3 lb./gal.; (5) Phygon at 2 oz./100 lb.; (6) Arasan SF at 1.5 lb./gal.; (7) Spergon SL at 2 lb./gal.; (8) Dow 9B at 3 2/3 oz./100 lb.; (9) Check.

Over-all Preference: (1) Phygon at 2 oz./100 lb.; (2) KF 467; (3) Phygon XL at 2 lb./gal.; (4) Phygon XL at 4 lb./gal.; (5) Spergon at 3 oz./100 lb.; (6) Spergon SL at 2 lb./gal.; (7) Spergon SL at 4 lb./gal.; (8) Arasan at 2 oz./100 lb.; (9) Arasan SF at 3 lb./gal.; (10) Arasan SF at 1.5 lb./gal.; (11) Dow 9B.

Note: KF 467 is a mercury compound; dust is irritating to operator. Dow 9B is not worth further trial.

POTATO

EARLY BLIGHT: Alternaria solani

Replicated field plots, power sprayed 7 times, June 15 to August 13 at Willard, Ohio -- J. D. Wilson

Disease severe, causing defoliation of 80 percent on checks. L.S.D. at 19:1 = 53 bu. DDT used in all sprays at 1 lb.

In Order of Yield: (1) Vancide 51 + ZnSO₄, 4-1-100 (564 bu.), (2) CHCO + p.e.p.s., 4-1/2-100 (563 bu.), (3) Dithane D-14 + ZnSO₄, 4-1-100 (554 bu.), (4) Dithane Z-78, 2-100 (552 bu.), (5) SEBD + MnSO₄, 4-1-100 (550 bu.), (6) Comp. 1217, 7-100 (547 bu.), (7) Manzate, 2-100 (538 bu.), (8) Robertson Fun. + p.e.p.s., 2 1/2-1-100 (536 bu.), (9) SDDC-A + ZnSO₄, 4-1-100 (532 bu.), (10) SDDC + ZnSO₄, 4-1-100 (532 bu.), (11) Cu Cupferron, 3-100 (530 bu.), (12) Crag #658, 2-100 (527 bu.), (13) Tribasic + p.e.p.s., 4-1/2-100 (523 bu.), (14) Cop-O-Zinc

+ p.e.p.s., 4-1/2-100 (517 bu.), (15) Tribasic 4-100 (503 bu.), (16) OS337D, 4-100 (498 bu.), (17) Check (475 bu.).

EARLY BLIGHT (severe):

A comparison with 9 fungicides used at 1X concentration at 160 gal. per acre and the same at 2X concentration and 80 gal. per acre, applied 7 times with power sprayer to replicated field plots at Willard, Ohio -- J. D. Wilson.

Results showed defoliation was less, therefore control better, with 2X in 9 of 11 instances, and yields were greater with 2X in 8 of the 11.

Materials used in order of 2X yields were: (1) Dithane Z-78, Vancide 51, Manzate, (2) Tribasic, (+ 4 different insecticides), Zerlate, Cop-O-Zinc, Crag 658, (3) OS377 (injurious).

Another experiment with COC-S and with Manzate indicated that no loss of control of early blight resulted from quadrupling the concentration and reducing the gallonage correspondingly from 160 to 40 gals. per acre, respectively.

EARLY BLIGHT (severe):

Replicated field plots, Katahdin, power sprayed, 8 applications plus DDT between July 5 and September 10, at Wooster, Ohio. -- J. D. Wilson

In Order of Yields: L.S.D. at 19:1 = 32 bu.: (1) SEBD + MnSO₄ 4-1-100 (601 bu.), (2) Same plus ZnSO₄ (596), (3) Methasan S 3-100 (590) and SDDC-A + ZnSO₄ (590), (4) Dithane Z-78 2-100 (573) and Manzate 2-100 (572), (5) SDDC + ZnSO₄ 4-1-100 (570), (6) Vancide 51 + ZnSO₄ 4-1-100 (568), Zerlate 2-100 (566), (7) Copper hydrate 3 1/2-100 (546), COC-S 4-100 (544), (8) Tribasic + p.e.p.s. 4-1/2-100 (520), (9) Copper Cupferron 3-100 (515), CHCO 3-100 (514), COC-S-cl 4-100 (510), (10) Cop-O-Zinc 4-100 (499), Crag #658 2-100 (494), Bordeaux 8-8-100 (494), Tribasic 4-100 (491), (11) Crag #1217 7-100 (482), (12) Baycar 2-100 (457), (13) OS377 4-100 (438), (14) Check (429).

LATE BLIGHT: Phytophthora infestans

Small replicated field plots; power sprayed 400 lbs. conventional drop boom; 11 applications July 13 to September 20. A Dithane D-14 concentration experiment at Ottawa, Canada, by K. M. Graham and J. B. Julien, reported by H. N. Racicot, comparing 2 qt. + 1 lb. ZnSO₄ in 100 g. - 66 g. - and 33 g. per acre. Av. foliage blight was 5.8-5.3 - 5.0% vs. 98.5% in check. The percentage surface of tubers with lesions was 1.94 - 1.77 - 1.68 for sprayed and 25.07 for checks.

LATE BLIGHT:

Power sprayed field plots; var. Green Mountain; 5 applications of 100 g. p. a.; July 19 to August 30 at Charlottetown, Prince Edward Island, by L. C. Callbeck.

Note: Of 5 new materials tested, only Perenox (Cu_2O) gave good control on foliage. (80 g = 100 U.S. g.)

Order of Disease Control: (1) Bordeaux 8-4-80, or Perenox 3 lb./80 g., (2) Dithane D-14 + ZnSO_4 2-1-80 g. or #1189 + Cu 5 lb./80 g., (3) Cop-O-Zinc 4 lb./80 g. or #1189 5 lb./80 g., (4) Crag 658 at 2/80 g. or Emulsifiable Copper Mercury 4 qt./80 g., (5) Emulsifiable Cu 4 qt./80 g. or Orthocide 2 lb./80 g.

Order of Yields: (1) Bordeaux, or Perenox, (2) Dithane or #1189 or Emulsifiable Copper Mercury, (3) Cop-O-Zinc, or Emulsifiable Cu, or #1189 + Cu, (4) Orthocide, (5) Crag 658.

Over-all Preference: (1) Bordeaux, Perenox, (2) Dithane, #1189 + Cu, (3) Cop-O-Zinc, #1189, (4) Crag, Emulsifiable Copper Mercury, (5) Orthocide, Emulsifiable Cu.

EARLY BLIGHT: *Alternaria solani*

Small plot field test of 5 replicate plots; small power sprayer 250 lbs.; 6 weekly applications of 150 g. p. a. on Cobblers beginning June 1, 1951, at Huttonsville, West Virginia, by M. E. Gallegly. (Some late blight present; DDT in all applications).

Order of Disease Control: (1) Manzate 1 1/2-100, (2) Parzate + Nutri-Leaf in last 2 applications 3-6-100, (3) Parzate Liquid + ZnSO_4 2-3/4-100, (4) Bordeaux 8-4-100, (5) C & H CuO + peps 3-1/2-100, (6) Parzate 2-100, (7) C & H CuO + Bentonite 3-1/2-100, (8) C & H CuO 3-100, (9) Parzate-Tribasic Cu alternating, (10) C & H CuO + Nutri-Leaf 3-6-100, (11) Tribasic 4-100, (12) Crag #658 2-100, (13) C & C #1217 7-100, (14) Check, DDT only.

Order of Yield: (1) Manzate, (2) C & H CuO + Bentonite, (3) Tribasic, (4) Parzate + Nutri-Leaf, (5) Parzate Liquid + ZnSO_4 , (6) C & C #1217, (7) C & H CuO + peps, (8) Bordeaux, (9) C & H CuO + Nutri-Leaf, (10) Parzate, (11) Parzate-Tribasic alternate, (12) C & H CuO, (13) Check, (14) Crag #658.

Over-all Preference: (1) Manzate, Parzate, Parzate + ZnSO_4 , Parzate + Nutri-Leaf, (2) Tribasic, C & H CuO + Bentonite, or same + peps, Bordeaux, (3) C & C #1217, C & H CuO, Crag #658, (4) Check.

Significant differences found between percentages of defoliation but not between yields.

EARLY BLIGHT (plus moderate amount late blight):

Small field plots, 4 replicates, power sprayed, 4-nozzle boom, 300 lbs.-150 gal., 6 applications, August 3 to September 22. Variety Pontiac, at Selbyville, Delaware, by J. W. Heuberg-

er.

In order of yields, with percentage defoliation in parentheses: Dithane Z-78 2-100 (28) 341 bu., Parzate 2-100 (54) 294 bu., Dithane D-14 2 qt.-1-100 (28) 283 bu., Dithane Z-78 1-100 (50) 283 bu., Orthocide 406 2-100 (50) 281 bu., Parzate + ZnSO_4 2 qt.-3/4-100 (35) 276 bu., Manganese E D B 1-100 (38) 276 bu., Same 1/2-100 (70) 267 bu., Robertson's Cu 1.7-100 (48) 263 bu., F-1003 + ZnSO_4 2 qt.-1-100 (34) 256 bu., Vancide 51 + ZnSO_4 1 1/2 qt.-1-100 (50) 249 bu., Dithane D-14 + MnSO_4 2 qt.-1-100 (54) 247 bu., Baycar #4255 4-100 (85) 241 bu., Bordeaux 6-3-100 (45) 237 bu., Tribasic 3-100 (56) 224 bu., Cop-O-Zinc 3-100 (76) 211 bu., Check (89) 208 bu., Baycar #4255 + lime 2-1/2-100 (86) 199 bu., Same without lime (90) 182 bu., Same + lime 4-1/2-100 (93) 151 bu. (L.S.D. 5% = 60 bu. and 1% = 79 bu.).

EARLY BLIGHT:

Field plots, Bean power sprayer, 4 applications July 6 to August 10. Brookings, South Dakota, by L. T. Richardson, reported by A. A. Cook.

Temperatures below normal, rainfall above. "No treatment prevented ultimate complete defoliation. Differences not statistically significant."

Order of Disease Control: (1) Dithane Z-78 2 lbs.-100 g., (2) Crag 658 2 lbs.-100 g., (3) Zerlate and Tribasic 2 lbs.- and 4 lbs.-100 g., (4) Bordeaux 8-8-100, (5) Cop-O-Zn 4 lbs.-100 g., (6) Tribasic 4 lbs.-100 g., (7) Phygon XL 1 lb.-100 g., (8) Zerlate 2 lbs.-100 g.

Order of Yields: (1) Zerlate, (2) Zerlate and Tribasic, (3) Tribasic, (4) Dithane Z-78, (5) Crag 658, (6) Bordeaux, (7) Phygon, (8) Cop-O-Zn.

SEED PIECE ROT: *Fusarium* sp.

Random split plot field comparison between Dithane 1 to 5 in talc and Arasan 1 to 11 in talc applied as dust to seed pieces, varieties Bliss Triumph and Russet Burbank, May 31 at Eaton and Yumpa, Colorado. G. H. Lane and C. A. Schaal, reported by W. D. Thomas, Jr.

Results: "Both materials provided 94 percent control, 6 percent increase in stand, and 13 to 30 percent increase in yield."

No preference (soil hot and dry) between Arasan 1:11 and Dithane Z-78 1:5 in talc.

RED CLOVER

One 20-replicate test of seed treatment with .5 percent Arasan in randomized field test at Urbana, Illinois, by J. W. Gerdemann showed 70.4 percent emergence, for both

treated and check.

One similar comparison, on alfalfa, showed 80.5 percent emergence for Arasan-treated seed against 77.6 percent for check, significant at 5 percent level.

SPINACH

DOWNY MILDEW

Field plots, variety Viroflay, 3 weekly applications of spray at 400 lbs. pressure, Riverside, California, by John T. Middleton and J. B. Kendrick, Jr.

In order of disease control at 1 lb./100 at 500 g.p.a.: (1) Mn Eth Bis, (2) Phygon and Orthocide, (3) CuO+S, (4) Parzate, (5) Check.

All safe, no yield differences, over-all preference MnEBD.

SWEET POTATO

BLACK ROT

Small plots, chemical dips of vine cuttings prior to planting. Ashford, Alabama, by J. A. Lyle. "Extremely dry soil conditions affected yields of all treated plots."

In Order of Preference: (1) Zerlate 1 lb./50 g., (2) Puratized Agricultural Spray 1:4500, (3) Phygon 1 lb./50 g., (4) Semesan Bel 1 lb./10 g. or HgCl₂ 1 oz./8 g., (5) Elgetol 1:400 or Fermate 1 lb./50 g., (6) Borax 1 lb./10 g. of water, (7) HgCl₂ 1 oz. + W Sul. 1.83 lbs. in 8 g. or Tersan 75 1 lb./50 g., (8) Puratized 178 1 lb./12 g. or Manzate 1 lb./50 g., (9) Bordeaux 4-4-50, (10) Spergon W 1 lb./50 g., (10) Check.

Plant bed, chemical dip prior to bedding, at Auburn, Alabama, by J. A. Lyle.

In Order of Preference: (1) Semesan Bel 1 lb./8 g. for 1 min., (2) Fermate 1 lb./50 g. instant dip, (3) HgCl₂ 1 oz./8 g. for 8 min., (4) Zerlate 1 lb. + W Sulf. 1.83 lbs. in 50 g. instant or HgCl₂ 1 oz./8 g. for 8 min. or W Spergon 1 lb./8 g. instant or Phygon 1 lb./8 g. instant or Puratized Agr. Spray 1:4500 instant or Check or Borax 1 lb./6 g. for 10 min.

Borax not worth further trial.

SHADE TOBACCO

BLUE MOLD (DOWNY MILDEW): Peronospora tabacina

Plants of field size in greenhouse converted to shade tent. Hand duster and sprayer. Applications twice a week for 6 weeks vs. once a week, comparing ferbam with zineb. Windsor, Connecticut, by P. J. Anderson.

Conditions under shade cloth covered greenhouse were 60 to 70° F. and relative humidity 80 to 90 percent, inoculated every 3 or 4 days.

General Conclusions: (1) Either ferbam 4 lbs. or zineb 3 lbs. in 100 gal. or as 30% dusts will control. (2) Zineb slightly better than ferbam. (3) Dusts a little better than sprays. (4) Necessary to apply twice a week. (5) Dusts less objectionable residue than spray. (6) All safe to plants and all gave good yields.

Order of Disease Control: (1) Zineb 30% dust bi-weekly at 12 lbs./acre. (2) Same weekly, or ferbam 30% dust weekly at 16 lbs./acre, or zineb spray bi-weekly at 3 lbs./100 gal. (3) Ferbam dust bi-weekly, or ferbam spray at 4 lbs. bi-weekly, or zineb spray at 3 lbs. weekly.

Plant bed, small plots, plunger duster 3 times a week for 5 weeks at 360 lbs./acre. North Florida Experiment Station, Quincy, Florida, by R. R. Kincaid.

Over-all Preference: (1) Dithane Z-78 or Parzate at 6.5% active. (2) Fermate at 15.2% active.

Order of Disease Control: (1) Dithane, Parzate, Mn Eth Bis 7%, (2) Fermate 15.2%, (3) Vancide 51 (no Zn) at 3.5%, (4) Phygon at 2%, (5) Orthocide 5%.

Vancide, Phygon injured 1951 and Mn Eth Bis injured 1952 only.

Yields: (1) Dithane, Parzate, Mn Eth Bis, (2) Fermate, Orthocide, (3) Phygon, (4) Vancide 51.

TOBACCO

BLUE MOLD: Peronospora tabacina

Plant beds, sprayed twice a week, using 72 gal. per 100 sq. yds., April 3 to April 30 as plants reached size of a dime, using hand pump bucket sprayer, at Pee Dee Experiment Station, Florence, South Carolina, by Quintin L. Holdeman.

Disease light and spotty, so although poorer chemicals could be determined, best could not be critically evaluated.

Over-all Preference: (1) Ferbam 4 lbs./100 and zineb 3 lbs./100.

Order of Plant Safety: (1) Eight safest were ferbam at 4 lbs., zineb at 3 lbs., Crag 5379 at 1 lb. and at 2 lbs./100, Vancide 51 at 3 and 6 lbs./100, ZnSO₄ 1 lb., Orthocide at 6 lbs./100, and NP-492 (Penn Sait Co.) at 8 lbs., (2) Crag 5400 at 1 lb., (3) Crag 5400 at 2 lbs., (4) Mn Eth Bis 100% active at 1 lb., (5) Same at 2 lbs. Unsafe were AC-F-54 at 1 lb. and AC-F-79 at 1/2 lb., and perhaps Orthocide at 8 lbs.

Poor control from NP-492, AC-F-79, partial control from Orthocide at 6 lbs., AC-F-54 at 1 lb. and Vancide 51 at 1 lb.

Objectionable odor to AC-F-54 and AC-

TOMATO

LATE BLIGHT

Field Plots: Power sprayer, 15 applications at 3 to 7 day intervals; Variety Mo. S-34 Florida -- Robert A. Conover.

Order of Disease Control: (1) Manzate (1 5/16-100), Orthocide 406 (4-100), Phygon XL (3/4-100), Parzate (2-100), Nabam + ZnSO₄ (2-1-100), Dithane Z-78 (2-100); (2) Tribasic (4-100); (3) OS377C (1 qt. and 2 qts. -100).

Plant Safety: (1) Manzate, Orthocide 406, Phygon XL, Parzate, Dithane Z-78, Tribasic; (2) Nabam + ZnSO₄; (3) S377C (1 and 2 qts.).

Yield: (1) Manzate; (2) Orthocide 406, Phygon XL, Parzate, Nabam + ZnSO₄, Dithane Z-78, Orthocide 406; (3) Tribasic; (4) OS377C (1 qt. and 2 qts.).

Over-all Preference: (1) Manzate, Phygon XL, Parzate, Dithane Z-78; (2) Nabam + ZnSO₄; (3) Orthocide 406, Tribasic; (4) OS377C (1 qt. and 2 qts.).

EARLY BLIGHT AND NAILHEAD LEAF SPOT

Field Plots: Power sprayer, 10 applications at 7 day intervals; Varieties Marglobe and Break-O-Day. West Virginia -- M. E. Gallegly.

Order of Disease Control: (1) Dithane Z-78 (3-100); (2) Bordeaux (8-4-100); (3) Parzate (3-100); (4) C. & H. CuO + p.e.p.s. (3-1/2-100); (5) Manzate (1 1/2-100); (6) Liquid Parzate + ZnSO₄ (2-3/4-100); (7) C. & H. CuO + Bentonite (3-1/2-100); (8) Parzate (2-100); (9) C. & H. CuO (3-100); (10) Parzate-Bordeaux*; (11) Methasan-Tribasic**; (12) Parzate-Tribasic (alternating); (13) Tribasic (4-100).

Plant Safety: (1) Parzate (2 and 3), Dithane Z-78, Liquid Parzate, Manzate; (2) Parzate-Bordeaux*, Parzate-Tribasic (alternating), Methasan-Tribasic**, Tribasic, C. & H. CuO (all); (3) Bordeaux.

Yield: (1) Parzate (3-100); (2) Parzate (2-100), Parzate-Tribasic; (3) Dithane Z-78, Methasan-Tribasic**; (4) Parzate-Bordeaux*; (5) Liquid Parzate; (6) Bordeaux; (7) Tribasic; (8) Manzate; (9) C. & H. CuO + p.e.p.s., C. & H. CuO + Bentonite; (10) C. & H. CuO (=check).

Over-all Preference: (1) Parzate (2-or-3-100), Dithane Z-78, Liquid Parzate + ZnSO₄; (2) Parzate-Bordeaux*, Bordeaux, Parzate-Tribasic (alt.), Manzate, Tribasic; (3) Methasan-Tribasic**, C. & H. CuO (all).

* Parzate until first fruit ripe, then Bordeaux

**Methasan for first two applications, rest tribasic.

Note: Calument and Hecla Copper Oxide is 75% metallic copper.

EARLY BLIGHT

Field Plots: Hand duster, 11 applications at 7 day intervals; Variety Rutgers. Alabama -- Raymond L. Self.

Order of Disease Control: (1) Zineb (7% and 10%), Manganese Carbamate (6%); (2) Crag 658 (6%); (3) Tribasic (5%); (4) Zineb (5%); Tribasic (7%).

Yield: (1) Manganese Carbamate; (2) Zineb (10%); (3) Zineb (7%); (4) Crag 658; (5) Tribasic (5%); (6) Tribasic (7%); (7) Zineb (5%).

Over-all Preference: (1) Manganese Carbamate; (2) Zineb (7% and 10%); (3) Crag 658; (4) Tribasic (5%), Zineb (5%); (5) Tribasic (7%).

Note: Hot dry season, foliage diseases not serious in most locations. Tests were principally phytotoxicity tests.

EARLY BLIGHT

Field Plots: Hand spray, 8 to 12 applications at 7 day intervals at four locations; Variety Rutgers. Alabama -- Raymond L. Self.

Order of Disease Control: (1) Manganese carbamate (1 1/2-100), Liquid Parzate + ZnSO₄ (2-3/4-100), Dithane D-14 + ZnSO₄ (2-3/4-100); (2) Zineb concentrate (2-100); (3) Tribasic (4-100), Crag 658 (1 1/2-100).

Plant Safety: (1) Manganese carbamate, Crag 658; (2) Zineb concentrate, Tribasic; (3) Liquid Parzate, Dithane D-14.

Yield: (1) Manganese Carbamate; (2) Crag 658, Control; (3) Tribasic; (4) Zineb concentrate; (5) Liquid Parzate, Dithane D-14.

Over-all Preference: (1) Manganese Carbamate; (2) Zineb concentrate; (3) Tribasic, Crag 658; (4) Liquid Parzate, Dithane D-14.

EARLY BLIGHT

Field Plots: Hand duster, application May 9, 18, 28, June 9, 20; Varieties Rutgers and Ontario. South Carolina -- W. M. Epps.

Order of Disease Control: (1) Tribasic (6%); (2) Dithane Z-78 (3.9%), Parzate (3.9%), HL 525 (=control); (3) Phygon (1%), Pittsburg Agricultural Chemical 4255 (1%); (4) Orthocide 406 (5%).

No apparent injury from any material.

Yield: (1) Tribasic; (2) Phygon, Pitts. 4255; (3) HL 525, (=control); (4) Orthocide 406; (5) Parzate; (6) Dithane Z-78 (differences in yield not significant).

Over-all Preference: (1) Tribasic; (2) Dithane Z-78, Parzate.

ANTHRACNOSE AND EARLY BLIGHT

Field Plots: Power spray, 5 applications July 15 to August 31; Varieties Gem and Red Jacket. New York -- W. T. Schroeder.

Order of Early Blight Control: (1) Zerlate-Bordeaux (Z-Z-B-Z-B. 4 lbs./acre Z, 16-8/acre B), Manzate (4 lbs./acre), Orthocide (6 and 8 lbs./acre); (2) Zerlate (4 lbs./acre).

Anthrachnose Control: All equal.

No apparent differences in plant safety.

Yield: (1) Manzate, Orthocide (6 and 8 lbs); (2) Zerlate-Bordeaux; (3) Zerlate.

Over-all Preference: All except straight Zerlate.

ANTHRACNOSE

Field Plots: Power sprayer, 5 applications at 10 day intervals; Variety Rutgers. New Jersey -- B. H. Davis.

Order of Disease Control: (1) Orthocide 406 (4-100), Dithane D-14 (2-100), Parzate (2-100), Dithane D-14 + Zerlate (tank mix 1-1-100), Zerlate-Tribasic (2-100 and 4-100)*, Dithane D-14-Tribasic (2-100 and 2-100)*, Manzate, Zerlate alternating with Tribasic; (2) Zerlate + Tribasic (tank mix 1-2-100); (3) Tribasic; (4) Gen. Chem. Co. compound 1189, Shell XP-50.

No apparent injury.

No significant difference in yield.

Over-all Preference: (1) Zerlate; (2) Zerlate alternating with Tribasic; (3) Manzate; (4) Orthocide; (5) Dithane.

*Three applications of first material followed by two applications of second material.

SEPTORIA LEAF SPOT AND ANTHRACNOSE

Field Plots: Power sprayer with orchard-type gun, 5 applications on 10-day schedule begun 20 days after first cluster flowered; Variety Illinois 97A. Illinois -- M. B. Linn and P. M. Miller.

Order of Septoria Control: (1) Manzate (1.3-100), Dithane Z-78 (2-100); (2) Orthocide 406 (3-100), Tribasic (4-100), Tribasic + p.e. p.s. (3-0.5-100), Dithane Z-78 + p.e.p.s. (2-0.5-100).

Order of Anthracnose Control: (1) Manzate, Orthocide 406, Dithane Z-78, Dithane Z-78 + p.e.p.s.; (2) Tribasic, Tribasic + p.e.p.s.

Yield: (1) Manzate, Orthocide 406, Tribasic + p.e.p.s.; (2) Tribasic, Dithane Z-78, Dithane + p.e.p.s.

Over-all Preference: (1) Manzate, Tribasic, Dithane Z-78 (2) Orthocide 406, Tribasic + p.e.p.s.; Dithane Z-78 + p.e.p.s.

SEPTORIA LEAF SPOT

Field Plots: Power sprayer, applications July 6, 16, and 26; Variety Victor. South Da-

kota -- A. A. Cook and L. T. Richardson.

Order of Disease Control: (1) Alternating Zerlate-Tribasic-Zerlate; (2) Cop-O-Zink (4-100); (3) Tribasic (4-100); (4) Yellow Cuprocid (1 1/2-100); (5) Phygon XL (1/2-100); (6) F 1003 (2 qts.-100); (7) Zerlate (2-100); (8) Dithane Z-78 (2-100).

Yield: (1) Alternating Zerlate-Tribasic; (2) Phygon XL; (3) F 1003; (4) Tribasic; (5) Zerlate; (6) Cop-O-Zink; (7) Dithane Z-78; (8) Yellow Cuprocid.

Over-all Preference: Alternating Zerlate-Tribasic-Zerlate.

TURNIP GREENS

CERCOSPORELLA LEAF SPOT

Field Plots: Power sprayer, applications 10, 15 days. Tennessee -- J. A. Andes.

Order of Disease Control: (1) Fermate (2-100), Bordeaux (4-3-50); (2) Dithane Z-78 (2-100).

Plant Safety: Bordeaux caused serious injury.

Yield: (1) Fermate, Dithane Z-78; (2) Bordeaux.

Over-all Preference: (1) Fermate; (2) Bordeaux; (3) Dithane Z-78.

RASPBERRY

ANTHRACNOSE:

Power sprayed field plots: 4 varieties, 1 semi-dormant and 1 pre-blossom application at 500 lbs. pressure and 300 g.p.a. -- at Kentville, Nova Scotia, by K. A. Harrison.

Over-all Preference: (1) Lime sulfur 1-10 followed by ferbam 2 lbs./100, (2) Elgetol 1% followed by ferbam 2 lbs./100, (3) Bordeaux 10-10-100 followed by bordeaux 5-5-100.

Order of Disease Control: (1) Bordeaux-bordeaux, (2) Lime sulfur-ferbam, (3) Elgetol-ferbam.

Standard practice has been Elgetol followed by ferbam but this year others were better.

RED AND BLACK CURRANT AND GOOSEBERRY

WHITE PINE BLISTER RUST: Cronartium ribicola

Small Power Sprayed Field Plots: 2 applications, May 11 and June 9, leaves sprayed from beneath with special nozzles -- Kentville, Nova Scotia, by Carl O. Gamley.

Order of Disease Control and Percentage Infected Leaves 30th July: (1) Phygon XL at 1 lb./100, 2.14%, (2) Ferbam 7.85%, (3) Mag. 70 sulfur 9.19%, (4) Tag 15.49%.

Tag not worthy of further trial.

ORNAMENTAL PLANTS

Turf

P. A. Miller, University of California, Los Angeles, reports results of treatments of Seaside Bent turf for control of dollar spot (*Sclerotinia homoeocarpa*). Materials applied bi-weekly with sprayer maintaining 40 lbs. pressure, 10 gals. per 1000 sq. ft.; first application June 12, last September 5. Based on disease control and plant safety the rankings were as follows, in descending order: Cadmate (1.6 oz./10 gals.), Calo-clor (2.0 oz./10 gals.), PMAS (0.1 pint/10 gals.), Puraturf 177 (1.6 oz./10 gals.), Calo-cure (2.0 oz./10 gals.), Crag 1025 (3.0 oz./10 gal.), Orthocide 406 (3.0 oz./10 gals.).

Rose

W. D. Thomas, Jr., Ft. Collins, Colorado, tested several materials for control of powdery mildew (*Sphaerotheca pannosa* f. *rosae*) on greenhouse roses. Two applications 9 days apart were made with a power sprayer. Excellent results were obtained with Manzate (2 lbs./100 gals.), Iscothan (8 oz./100 gals.), and Goodrite z. a. c. (2 lbs./100 gals.). Results with Dithane Z-78, Zerlate, Crag 658, Dow DHAS, OS377D, all at 2 lbs./100 gals., 51-P-162 (1/4 oz./100 gals.) and Puratized Agricultural Spray (1/2 pint/100 gals.) were fair to poor, and these materials were not considered worthy of further trial.

Iris

Leafspot (*Didymellina macrospora*). Spray tests reported by A. W. Dimock, Ithaca, New York. Materials applied with power sprayer about once a week from mid-June until September. Good control was obtained with Dithane Z-78 (1 lb./100 gals.), Crag 5400 (2 lbs./100

gals.), Crag 5379 (2 lbs./100 gals.), and Puratized Agricultural Spray (3/4 pint/100 gals.). Poor control was obtained with Geary 4255, Crag 341 plus lime (1 qt./1/2 lb./100 gals.), Vancide 51 plus zinc sulfate (2 qts./1 lb./100 gals.), Vancide 51 plus Pyrax AAB (2 qts./1 lb./100 gals.), and COCS (1 lb./100 gals.). Severe injury occurred with COCS.

Chrysanthemums

Leafspot (*Septoria obesa*). Methods, materials, and application as above. Excellent control obtained with Vancide 51 plus zinc sulfate, Crag 5400, Crag 341 plus lime, COCS, Vancide 51 plus Pyrax AAB, and Crag 5379. Fair control with Dithane Z-78, Geary 4255, and Puratized Agricultural Spray. The poor ranking of Z-78 is hard to understand since zineb wettable powders have given excellent results in previous trials.

Snapdragons

Rust (*Puccinia antirrhini*). Methods, materials, and application as above. Good control was obtained with Dithane Z-78, Vancide 51 plus zinc sulfate, Crag 341 plus lime and Crag 5379. Fair control was obtained with Crag 5400 and Vancide 51 plus Pyrax AAB. Poor control was obtained with Puratized Agricultural Spray and COCS. Geary 4255 killed the plants. Plant injury was noted with Puratized and Vancide plus Pyrax.

China asters

Rust (*Coleosporium solidaginis*). A. W. Dimock reported an unreplicated, but checked, test of Dithane Z-78 for control of aster rust. Applications were made about once a week from mid-July until September. Although rust was present in the plots when treatments were started, further spread was checked and the contrast between the treated and untreated beds was striking at the end of the season.

FUNGICIDES FOR FRUIT CROPS -- 1951

Cooperators

- | | |
|--------------|---|
| California: | L. J. Klotz, T. A. deWolfe, E. C. Calavan, T. R. Sulvicool, J. T. Middleton -- Phytophthora rot of citrus, Botrytis blossom blight of citrus. |
| | E. E. Wilson, W. H. English -- brown rot (<i>Monilinia laxa</i>) on apricot, G. A. Zentmyer, W. A. Thorn -- avocado rot |
| Connecticut: | S. Rich -- apple scab |
| Delaware: | P. L. Poulos, J. W. Heuberger -- apple scab, fly speck and sooty |

blotch on apple

- Florida: R. F. Suit -- melanose on grapefruit
- Georgia: J. R. Cole, pecan scab
- Illinois: D. Powell -- apple scab, fire blight on apple, Botrytis rot of strawberry
- Indiana: J. R. Shay -- black pox on apple
- Iowa: H. L. Lautz, W. F. Buchholtz -- apple scab, O. F. Hobart, W. F. Buchholtz -- *Fabraea* spot on pear
- Kansas: E. Abmeyer -- apple scab, black rot on apple
- Maine: M. T. Hilborn -- apple scab
- Massachusetts: E. F. Guba -- apple scab, apple foliage tolerance
- Michigan: A. E. Mitchell, W. Toenjes -- apple scab
- Missouri: H. G. Swartwout -- apple scab, spray russet on apple, fire blight on apple and pear, sooty blotch and fly speck on apple, black rot and downy mildew of grape, strawberry leaf spot and scorch, brown rot and scab on peach, leaf spot on cherry
- New Hampshire: M. C. Richards, R. Eggert and O. R. Murphy -- apple scab
- New York: J. M. Hamilton, M. Szkolnik -- apple scab, cherry leaf spot and arsenical injury, D. H. Palmiter -- apple scab, A. J. Braun -- downy mildew of grape
- North Carolina: H. C. Fink, C. N. Clayton, J. F. Fulkerson, apple scab, black rot, bitter rot and fruit spot on apple, bacterial spot and brown rot of peach.
- Ohio: H. F. Winter -- apple scab, raspberry anthracnose
- Oregon: J. R. Kienholz -- *Gloeosporium* rot on apple
P. W. Miller, walnut bacteriosis
- Pennsylvania: F. H. Lewis, H. W. Thurston -- apple scab
- South Carolina: H. H. Foster -- brown rot on peach
- Virginia: A. B. Groves -- apple scab
- Washington: R. Sprague, powdery mildew on apple, fire blight on pear, powdery mildew on peach
- Wisconsin: J. B. Moore, G. W. Keitt -- apple scab
- CANADA**
- British Columbia: M. F. Welsh, G. R. Thorpe -- apple scab
- Nova Scotia: J. F. Hockey, R. C. Ross -- apple scab
- Ontario: G. C. Chamberlain -- apple scab, downy mildew of grape.

APPLE SCAB

Connecticut, S. Rich. Apple scab on McIntosh. Schedule April 24, May 3, 14, 25, June 7, 21 (half tree plots).

Order of Disease Control: (1) Phygon XLN 1/2-100. (2) Orthocide 406 2-100. (3) 406 1/2-100, Cr 305 2-100. (4) Ferbam-sulfur 1-3-100. (5) Cr 305 1/2-100

Order of Plant Safety: (1) 406 1/2-100, 406-2-100, ferbam sulfur. (2) Phygon. (3) Cr 305, 1/2-100. (4) Cr 305 2-100.

Order of Preference (1) Phygon, 406 2-100. (2) Ferbam-sulfur. (3) 406 1/2-100. (4) 305 2-100. (5) 305 1/2-100.

Delaware, P. L. Poulos and J. W. Heuberger. Scab on Red Delicious and Stayman.

Schedule: Delayed dormant April 6, prepink + K April 12, pink April 19, fall pink April 25, bloom April 30, petal fall May 7, 1st cover May 14, regular Delaware schedule of Mag 70 2nd cover and bordeaux in 4 more covers.

Light scab infection Mag 70. Sulfur Nu Green and Nu Green alone gave control used in prepink, pink and petal fall, with LS or sulfur in other sprays. Fruit russet was negligible in Red Delicious but moderate for all treated Stayman trees. NuGreen alone or with sulfur caused no effect on color development or fruit development.

Illinois, D. Powell. Apple scab and fire blight on Jonathan, Rome, Starking and Golden Delicious. Scab counts on all varieties, fire blight counts on Jonathan and Rome Beauty. Schedule prepink, May 1, pink May 8, bloom May 12, calyx May 21, covers June 1, 11, 25.

Order Scab Control (percentage leaves with scab June 1): Dithane D-14 1 qt. ZnSO_4 1 lb. (.08), Parzate 2-100 (.08), Permicide 1 pt. -100 (0.16), Zineb 2-100 (.42), Dithane D-14- $\text{Fe}_2(\text{SO}_4)_3$ 1 qt. -1-100 (.42), manganese ethylene bis 2-100 (.66), Orthocide 406 2-100 (.92), 5379 2-100 (.92), 5400 2-100 (1.60), Kolospray 8-100 (1.83), Check 7.5 percent L.S.D. .05 = 2.18.

(July 6) Permicide (02), 5400 (.66), Zineb (1.25), Kolospray (1.40) Orthocide 406 (1.58), Parzate (1.75), Man. bis (2.00) Dithane D-14 + Zn (2.40), Dithane D-14 + Fe (2.80), Dithane 278 (2.80), 5379 2.80, Check 30.4 percent L.S.D. .05 = 6.96.

Order Scab Control (1% fruit scab): Orthocide (1.1), Dithane Z-78 (1.8), Parzate (2.0), Man-bis (2.3), zineb (3.6), 5400 (3.9), Kolospray (3.9), 5379 (4.5), Permicide (5.2), Dithane D-14 + Fe (6.0), Dithane D-14 + Zn (7.3), Check (41.7). L.S.D. .05 = 7.28.

Injury: Slight russet with Dithane D-14 plus zinc or iron, no injury on others.

Order of Blight Control (blighted twigs per

tree August 3): Parzate (4.3), Dithane 278 (4.3), Man bis (8.9), 5400 (13.0), Dithane D-14 Fe (13.7), Dithane D-14 + ZnSO_4 (16.2), Orthocide (20.8), zineb (22.0), 379 (23.2), Permicide (24.7), Kolospray (35.8), Check 17.3. (No significant differences).

Discussion: Scab was not serious this season, as shown by the low infection of the check plot. Orthocide was excellent for scab control. All treatments gave good control. The tank-mixed zineb was not so good as the formulated material. Manganese ethylene bisdithiocarbamate shows definite promise as an apple fungicide. Although the blight counts were not statistically significant, the zineb formulations of Parzate and Dithane Z-78 looked promising. In view of the increased infection from June 26 to August 3, it appears as though blight sprays should be continued through July for best results.

Iowa, H. L. Lautz and W. F. Buchholtz. Apple scab on Delicious.

Order of Scab Control on Leaves (percentage of control): Puratized (Agricultural)-wetable sulfur 1 pint - 4-100 (100) (99.9) L. S. - wettable sulfur 1/2-4-100 (99.9). L.S. + ferbam + wettable sulfur 1/2-3/4-2-100 (96.6). Crag 341 + lime 1 1/2 qt. -1/2-100 (96.4). One Pak 10-100 (93.8).

Order of Scab Control on Fruit: (1) 341 (91.0), Puratized (89.0), (2) One Pak (85.5), (3) L.S.-wetable S. (77.7), L.S.-ferbam-wet S. (77.7), (4) Puratized + wet. S. (68.0).

Kansas, E. Abmeyer. Apple scab and black rot on Jonathan, Winesap.

Schedule: pink, calyx, 1st cover.

"We were late in getting our fungicide program started last spring" ... Only the eradicator type fungicides such as Puratized Agricultural Spray gave anything like effective control. The protective type fungicides such as ferbam and wettable sulfurs were not effective as used last spring."

Maine, M. T. Hilborn. Apple scab on McIntosh.

Schedule prepink, pink, mid-bloom, petal-fall, 4 covers. Heavy carry-over, excellent infection weather. Scab was a major problem in commercial orchards.

Order of Scab Control: (1) Mike sulfur 8-100 all but petal fall and 1st cover Puratized Agricultural Spray 1 pint-100. (2) Phygon XL 1/2-100. (3) 341SC 1 1/2 qt. -100. (4) L.S. + PEPS 8-1/2-100. (5) Mike sulfur 8-100. Checks 100 percent scab.

Order of Plant Safety: (1) Mike sulfur + Puratized Agricultural, 341SC, Mike sulfur. (2) L.S. + PEPS. (3) Phygon

Order of Yield: (1) 341SC. (2) LS-PEPS.

(3) Mike S. (4) Phygon. (5) Mike sulfur - Puratized in 2 sprays.

Order of Preference: (1) Phygon. (2) 341SC. (3) Mike S + Puratized (4) Mike sulfur. (5) LS-PEPS.

Order of Scab Control (concentrates 8X): (1) sulfur-Phygon ferbam 3.5-1/2-3/4-100; (2) sulfur-Phygon 3.5-1/4-100; (3) Dry LS to bloom 8-100, then ferbam 3/4-100; (4) sulfur-Phygon-ferbam-TMTD 3.5-1/8-1/4-1/4-100; (5) Phygon-ferbam 1/4-3/4-100; (6) Mag. 70 10-100; (7) Dynacide 1/2-100 to bloom then 341SC 1 1/2 qt.-100. Check 48 percent.

Order of Plant Safety (8X concentration): (1) sulfur-Phygon-ferbam-TMTD; (2) sulfur-Phygon-ferbam; (3) Phygon-ferbam; (4) LS to bloom then ferbam; (5) Mag 70; (6) sulfur-Phygon; (7) Dynacide to bloom then 341SC.

Massachusetts, E. F. Guba. Apple scab and foliage tolerance.

Scab control was satisfactory generally.

McIntosh and Rhode Island Greening -- The following combinations caused no injury. DDT-lead arsenate 2-2-100 plus: ferbam 1 1/2-100, Epsom Salts 20-100, NuGreen 5-100, borax 1-100.

Koppers flotation sulfur paste 12-100 plus: DDT-Lead Arsenate 2-2-100. Epsom Salts 20-100, NuGreen 5-100, Borax 1-100.

Northern Spy and Delicious -- The following combinations caused no injury: Ferbam 1 1/2-100 plus: LA-DDT 2-2-100, Niagara TEPP 1/3 pt.-100, Epsom salts 20-100, NuGreen 5-100, borax 1-100.

DDT-LA 2-2-100 plus: Flotation Sulfur Paste 12-100, TEPP 1/3 pt.-100, Epsom Salts 20-100, NuGreen 5-100, borax 1-100.

Michigan, A. E. Mitchell and W. Toenjes. Scab on Jonathan (mercury vs. sulfur)

Delayed dormant wettable sulfur 8-100, Dynacide 1/2-100 or wettable sulfur 8-100 in pink, late bloom, and first cover, followed by ferbam rest of season.

Scab on leaves and fruit was less than 1 percent with both treatments. Severe fruit russetting in Dynacide block was less than 1 percent, but in the sulfur block was 15 percent. (Small trees and 600 lbs. pressure; injury was aggravated by sulfur but not by mercury).

Michigan, A. F. Mitchell and W. Toenjes. Apple scab on Jonathan, Red Delicious, and McIntosh. 2x and 4x concentrates in speed sprayer.

Schedule: Delayed dormant LS 2-100. Pink Magnetic 70 sulfur 8-100. Late full bloom Dynacide + Magnetic 70 sulfur 1/2-4-100 (65 hours after start of rain). 2nd, 3rd and 4th covers ferbam 3/4-100 or Crag 341 1 1/2 pint-100.

Less than 1 percent scab on Jonathan and Red Delicious leaves and fruit.

Order of Scab Control (McIntosh fruit): ferbam covers (16 percent scab) Crag 341 (22 percent). Trees omitting late full bloom, receiving ferbam covers with Dynacide-Mag 70 Paste in 2nd cover 1/2-4-100, 54 percent scab.

Order of Scab Control (Red Delicious): Wettable sulfur 8-100 pre-bloom, calyx and 1st cover (52 percent scab). Wettable sulfur 8-100 prepink - Dynacide 1/2-100 pink, calyx, 1st cover (19 percent scab). Both received ferbam in remaining covers.

Missouri, H. G. Swartwout. Apple scab eradication on Rome Beauty. No fungicides until 2nd cover spray then 2 sprays June 5 and 18. Considerable leaf scab and moderate fruit scab was present

Order of Scab Control: (1) Puratized Agricultural Spray 1 pint alone and with ferbam 3/4 lbs. (both highly effective; little difference between them). (2) Puratized Agricultural spray 1 pint + wettable sulfur 3 pounds (reduced effectiveness of Puratized). (3) Sulfur-ferbam mixture.

"Injury was light, consisting only of a yellowing and falling of a few of the more heavily scabbed leaves."

Missouri, H. G. Swartwout. Spray russet on Jonathan and Golden Delicious.

EPN and both powder and liquid parathion greatly increase russet on Golden Delicious over a sulfur ferbam/lead arsenate mixture. There was no great difference between materials on Jonathan.

New Hampshire, M. C. Richards, R. Eggert, and O. R. Murphy. Apple scab on McIntosh.

Order of Scab Control: (1) Phygon XL 1/2-100; (2) Kolospray 100, 3 1/2-100; (3) Kolofog 100, 3 1/2-100; (4) Puratized Agricultural Spray 1 pt.-100; (5) Dynacide 1/2-100; (6) Kolospray 6-100.

No differences in injury or yield.

Order of Preference: (1) Phygon, (2) Kolofog 100, (3) Kolospray 100, (4) Puratized Agricultural, (5) Dynacide, (6) Kolospray.

New York, J. M. Hamilton and M. Szkolnik. Fungicide tests on apples and cherries in 1951. New York State Hort. Soc. Proc. 97: 69-80. 1952. Rome apple in greenhouse, Cortland in field.

Fungicides Applied Before Infection Periods.

A number of carbamate materials chemically related to Fermate were tested for protection against scab, both on potted Rome Beauty trees grown in the greenhouse and on

Cortland in the field. Six field applications were made, the last being June 26. The 10-day spray was put on six days after the petal fall spray, and the first cover after an infection period of 36 hours. Fermate 1 1/2-100, as in previous years, was definitely superior to Micronized sulfur 5-100. Manzate 1 1/2-100 gave indication of being more effective than Fermate but there was some injury to the fruit when used in a complete schedule. Since the material is light colored and tends to improve the color of the fruit, it is hoped that it can be used in the cover sprays. A tank mix of Dithane D-14 1 qt. - 100 reacted with micronized ferric sulfate 1/2-100 was weak on scab control, but this may be due to formulation. Dithane D-14 1 1/2 pts. - 100, ferric sulfate 3/8-100, and Micronized 3-100 gave good scab control without injury. Dithane D-14 used at higher concentrations but without the sulfur gave injury. Two Carbide and Carbon materials, 5400, related to Fermate, and 5379, related to Manzate and Dithane D-14, gave promising results at comparable concentrations but neither is as retentive as Fermate or Manzate. Product 5379 gives the poorer protection. Both materials need reformulating. As in the case of Fermate, all of these carbamates may be expected to give excellent control of the rust fungi.

Crag 341 1 qt. -100 gave scab control comparable to Fermate in 1951. OS-377C, a Shell Oil material, was found to be an interesting material, particularly in regard to improving the finish of fruit. Injury is a possible factor but reformulation may minimize this drawback. Orthocide 406 gave a good scab control in this not too critical field test, although greenhouse tests showed that it has rather poor sticking properties.

An experiment comparing standard spraying with 8x concentrate on Cortland, Macoun and Delicious.

There is evidence, as might be expected, that better scab control can be obtained by hand spraying than by fixed outlet machinery. This shows up first at the interfaces of the trees. However, it is true that this varies with the material used. Tag 8x concentrate gave perfect scab control, whereas Fermate and Micronized gave 11 and 15 percent scab, respectively. Sulfur followed by Fermate in the cover sprays was a more effective spray schedule than sulfur throughout. Tag at 8x concentration severely russeted 30 percent of the Macoun and about 12 percent of the Cortland. Hand spraying caused 15 percent fruit russet on Macoun and light russet on Cortland. Fermate 8x concentration caused a black stippling on the Macoun. It was reported from New Jersey that Fermate caused enlarged lenticels and a roughened skin on McIntosh. Crag 341 1 qt. -100-8x, Orthocide 406 2-100, and Manzate 1 1/2-100 were put on as cover sprays, but

about all that can be said is that the red mite infestation was probably less on the Crag 341 trees.

Cortland -- Order Disease Control (percent scab in parentheses): (1) Tag 1/2 pt. precover, Fermate 1 1/2-100 covers (T). (2) Tag 1/2 pt. precover, 406 2 lbs. covers, 8x (1 percent). Tag 1/2 pt. precover, Manzate 1 1/2 lbs. covers 8x (1 percent). (3) Fermate 1 1/2-100 (4 percent). (4) Micronized 5-100 precover, Fermate 1 1/2-100 covers 8x (9 percent); micronized 5-100 (10 percent); Fermate 1 1/2-100 8x (11 percent); Fermate 1 1/2-100 precover, 341 1 qt. -100 covers, 8x (12 percent); micronized sulfur 5-100 8x (15 percent).

Delicious -- Order Disease Control: (1) Tag-Fermate, Tag-Fermate 8x, Tag-406 8x, Tag-Manzate 8x (T); (2) Fermate (4 percent), Micronized (5 percent); (3) Micronized 8x, (8 percent); Micronized-Fermate 8x (8 percent); (4) Fermate 8x (12 percent).

McIntosh sprays after 24-44 hours infection periods. Order disease control (percent of scab): (1) Crag 341 1 pt. + Tag 1/4 pt. (4 percent). (2) Orthocide 406 2-100 (8 percent). (3) Manzate 1 1/2-100 (11 percent). (4) Phygon 1/2-100 (24 percent). (5) Fermate 1 1/2-100 (28 percent). (6) Unsprayed (98 percent).

After-infection sprays of 69-96 hours on McIntosh. Order of Disease Control (percent of scab): 96-78, 82 and 87 hours -- (1) Tag 1/2 pt. -100 (5 percent). (2) L.S. 2-100 (28 percent). (3) Micronized sulfur (74 percent). (4) unsprayed 100 percent. 96, 78, 78, and 69 hours -- (1) Tag (7 percent). (2) L.S. (59 percent). (3) Micronized sulfur (92 percent).

Golden Delicious. Order of plant safety, russet rating -- 10 = complete russet and one is none: (1) Orthocide 406 2-100, 2.3; (2) micronized sulfur 5-100, 4.5; (3) Tag 1/2 pt. Fermate 1 1/2-100, 6.8; (4) Fermate 1 1/2-100, 8.2.

Lead Arsenate 2-100 and DDT 75% 1.3-100 was added in 10-day and 3 covers.

B1956 2 oz. was added to Fermate and Dupont spreader sticker 2 oz. to micronized and Orthocide in last 2 covers.

Unsprayed potted Rome trees were set under Cortland trees that had been sprayed. After 2.14 inches of rain the trees were taken to greenhouse, inoculated and given infection period. Hydraulic sprays -- Order of disease control (scab lesions per leaf on heaviest infected leaf per shoot): (1) fermate 1 1/2-100, 0; (2) micronized sulfur 5-100, 7; (3) Tag 1/2 pint-100, 49. Concentrate sprays -- (1) Fermate, 0; (2) Micronized sulfur, 5; (3) Tag 1/2 pt., 48; (4) unsprayed 97.

New York, D. H. Palmiter. Apple scab on McIntosh.

Schedule: Delayed dormant April 18, prepink April 25, pink May 2, bloom May 9, calyx May 14, curculio May 21, special May 28, covers June 2, 8, 25.

Disease Control (1 percent fruit scab): Phygon-ferbam 1/2-100, 1 1/2-100 (0.16). Crag 341-lime 1 1/2-3-100 (0.17). Tag-ferbam 1/2 pt.-100, 1 1/2-100 (0.22). Flotation Sulfur 12-100, 10-100 (0.35). Flotation-ferbam 12-100, 1 1/2-100 (0.42). Ferbam 1 1/2-100 (0.55). Micronized sulfur 8-100, 5-100 (1.23). Micronized sulfur + lime 8-5-100, 5-3-100 (1.31).

Order Disease Control: (1) Phygon-ferbam, (2) 341, (3) Tag-ferbam, (4) flotation, (5) flotation-ferbam, (6) ferbam, (7) micronized sulfur, (8) micronized S + lime.

Order of Yield (3 years average): (1) micronized sulfur + lime, (2) flotation sulfur-ferbam, (3) Tag-ferbam, (4) micronized sulfur, (5) ferbam, (6) Phygon-ferbam, (7) Crag 341, (8) flotation sulfur.

Order of Preference: (1) Flotation sulfur-ferbam, (2) Tag-ferbam, (3) ferbam, (4) Phygon-ferbam, (5) micronized sulfur + lime, (6) micronized sulfur, (7) Crag 341 + lime, (8) flotation sulfur.

Schedule: Green tip April 17, delayed dormant April 24, prepink May 1, pink May 8, calyx May 18, curculio May 25, special June 4, covers June 13, 25, July 7, 18.

Leaf Scab Lesions/30 Terminals: (1) Phygon + ferbam 1/4-3/4-100 (0.5). (2) Orthocide 406 2-100, 2. Manzate 1 1/2-100, 3.3. (3) Sulfur-ferbam 4-3/4-100, 20.8. (4) Ferbam 1 1/2-100, 90. (5) Micronized sulfur 8-100, 102.

Percent of Fruit Scab: (1) Manzate 1 1/2-100, t; 406, t; Phygon ferbam, t; Puratized + ferbam, t. (2) Sulfur + ferbam, 1.0. (3) Micronized sulfur, 2.7; ferbam, 2.7.

Order of Disease Control: (1) Phygon-ferbam, Puratized-ferbam. (2) 406. (3) Manzate. (4) Sulfur + ferbam. (5) Ferbam. (6) Micronized sulfur.

Order of Preference: (1) Phygon + ferbam, Puratized-ferbam. (2) 406. (3) Ferbam. (4) Sulfur-ferbam. (5) Micronized sulfur. (6) Manzate, ferbam, in cover sprays after Manzate, Phygon ferbam and Puratized ferbam.

North Carolina. H. C. Fink and C. N. Clayton. Apple scab and fruit finish on Red Delicious, Golden Delicious, Stayman, Rome Beauty.

Order of Disease Control:

Red Delicious -- no fruit scab with 341, sulfur-BM, Phygon-ferbam, or 406. Checks 7 percent.

Golden Delicious -- (1) no scab with 341,

sulfur-bordeaux, Phygon-ferbam or 406; (2) 1 percent with Phygon-ferbam.

Stayman -- (1) 406 (none) (2) sulfur-bordeaux (1 percent) (3) 341, Phygon-ferbam (2 percent) (4) check (6 percent) Rome Beauty (1) sulfur-bordeaux, Phygon-ferbam, 406 (1 percent).

Order of Plant Safety (russet):

Red Delicious -- (1) none on 341, sulfur-bordeaux, 406. (2) Phygon-ferbam (spotting)

Golden Delicious -- (1) 406 (very light). (2) 341, Phygon-ferbam, (light). (3) Sulfur-bordeaux (very bad).

Stayman -- (1) 341, 406 (light). (2) Sulfur-bordeaux, Phygon-ferbam, (bad).

Rome -- (1) 341, sulfur-bordeaux, 406 (none). (2) Phygon-ferbam (light).

Order of Plant Safety (color):

Golden Delicious -- (1) 406 (excellent). (2) 341, Phygon-ferbam, (good). (3) Sulfur-bordeaux (poor).

Stayman -- (1) 406 (excellent). (2) 341, sulfur-bordeaux (good). (3) Phygon-ferbam (poor).

North Carolina, H. C. Fink and C. N. Clayton. Scab, leaf spot, and russet on Delicious.

Order of Disease Control -- leaf scab (percent): (1) Phygon-ferbam (1 percent). (2) SEM, 406, (2 percent). (3) 341, (6 percent). Fruit scab (percent): (1) 406 (0.5 percent); Phygon-ferbam (0.6 percent); 341 (0.7 percent); sulfur-bordeaux (1.2 percent).

Order of Plant Safety (russet -- 0 = none, 5 = severe): (1) 341 (0.2), 406 (0.2), sulfur-bordeaux (0.5). (2) Phygon-ferbam (4.2)

Crag 341-lime 1 1/2 qt. -1/2-100. Nine sprays with parathion 1-100 in five. Lime sulfur 1 1/2 prepink, 2-100 pink; flotation paste 12-100 calyx and 1st cover; bordeaux 2-4 in 2nd cover, 3-6 in 3rd cover, 4-8 in last 3 covers. Parathion 1-100 in five sprays. Phygon XL-sticker 3/4 lbs. -2 oz. -100 in four sprays, ferbam 1 1/2-100 [?] sprays. Lead arsenate in five sprays. Orthocide 406 2-100 nine sprays, EPN 3/4-100 in five sprays.

Order of leaf spot: (1) 341, (1). Phygon-ferbam (1). (2) Sulfur-bordeaux (2). (3) 406 (6). Check (9)

Ohio, H. F. Winter. Apple scab on McIntosh, Cortland, Red Delicious and Rome.

Order Disease Control (percent scab) B & E Orchard:

McIntosh -- (1) Puratized Agricultural Spray 1 pint, 1.6. (2) Crag 341 3 pt., lime 1/2 lb., 11.2. (3) M. sulfur 5 lbs., 49.2. (4) Check 100.

Table 1. Apple scab tests, Ohio, 1951. Concentrate versus dilute, Apple Creek orchard.

Materials in 100 gallons	Gallons per tree	Percent scab	
		Red Delicious	Rome
M. Sulfur 6 lbs. (1X)	18	0.5	12.0
M. Sulfur 30 lbs. (5X)	3 1/2	1.8	6.6
M. Sulfur 48 lbs. (8X)	1 3/4	1.0	12.0
Flot. Sulfur 12 lbs. prebloom, Tag 1/2 pt. petal fall and 1st. cover, M. Sulfur 5 lbs. remainder (1X)	18	0.0	1.5
Flot. Sulfur 96 lbs. prebloom, Tag 4 pts. petal fall and 1st. cover, M. Sulfur 40 lbs. remainder (8X)	1 3/4	1.4	3.1
Crag 341 3 pts., lime 1/2 lb. (1X)	18	0.4	0.5
Crag 341 24 pts., lime 4 lbs. (8X)	1 3/4	1.0	3.3
Orthocide 406 2 lbs. prebloom, M. sulfur 5 lbs. remainder of season (1X)	18	0.0	0.7
Orthocide 406 16 lbs. prebloom, M. sulfur 40 lbs. remainder of season	1 3/4	0.6	0.0
MnEBD 1 1/2 lbs. (1X)	18	0.0	0.0
MnEBD 12 lbs. (8X)	1 3/4	0.8	0.5

Cortland -- (1) Puratized 0.3, 341 1.4.
(2) M. sulfur 11.7, Check 100.

Rome -- (1) Mn EBD 1 1/2 lbs. 4.3.
(2) Fermate 1 1/2 lbs. peps 1/2 lb., 11.1; Fer-
mate 1 1/2 lbs. 12.1; M. sulfur 6 5 lbs., peps
1/2 lb., 12.0. (3) M. sulfur 6 5 lbs. 33.1. (4)
Check 100.

Apple Creek Orchard (See Table 1)

Red Delicious -- (1) Orthocide 406 2
lbs. pre-bloom, M. sulfur 5 lbs. in remainder,
MnEBD, 0.0; Crag 341 3 pt. lime 1/2 lb., 0.4;
M. sulfur 5 lbs., 0.5.

Rome -- (1) MnEBD 0.0; Crag 341 3
pt. + lime 1/2 lb., 0.5; Orthocide 406 prebloom,
M. sulfur post bloom, 0.7. (2) M. sulfur bloom
5 lbs. 12.0.

Pennsylvania, F. H. Lewis, Apple scab and
mites on Stayman, Black Twig. (See Table 2).
Applications April 24, 30, May 14, 21, June 1,
summer sprays June 15, 29, July 9, 21.

Dilute sprays: Through 1st cover, Mag 70S,
8-100 prepink, ferbam sulfur 1-4-100 through
1st scab. Summer sprays with ferbam DDT 1-2
gave 2.67 percent fruit scab on Stayman, 1 per-
cent fruit scab on Black Twig; with phenophthia-
zene lead arsenate mixture (du Pont), 5-100 (fer-
bam, DDT Aramite 1-2-2-100 in 5th cover) gave
1.33 percent fruit scab on Stayman, 1 percent
fruit scab on Black Twig.

Concentrate spray (3X): Order of scab
control (average percent of fruit scab on
Stayman and Black Twig October 1) -- (1)
Puratized Agricultural Spray 1 pt. -100
through 1st cover, 341SC-DDT 1 1/2 qt. -2-
100 summer (2.9 percent); Puratized Agricul-
tural Spray 1 pt. -100 through 1st cover,
phenophthiazene-lead (du Pont)-DDT 5-2-400
in summer (ferbam-DDT. Aramite 5th cov-
er) (3.2 percent); Puratized 1 pt. -100
through 1st cover, Orthocide-DDT 2-2-100
summer (3.5 percent) (See Table 2)

Plots were 3 rows wide and 5 or 6 trees
long. Sprays applied with Speed Sprayer
35,000 cubic feet of air per minute, 2 1/4
miles per hour, and 3 1/2 to 4 gallons of
spray per tree for concentrate (varied some
with different sprays) and 13 gallons for di-
lute.

Dormant spray, March 21 -- Concentrate
on Plots 1, 2, 3, 4, 5, 6, 7, 9, 11, 12, 13, 15, and
16, using DN 1 1/2 quarts plus oil, 3 gallons.
No dormant on 8, 10, and 14.

Delayed-dormant, April 16 -- Plots 1
and 2 dilute, Bordeaux mixture 2-2-100 plus
oil 1 gallon. Plots 3, 4, 5, 6, 7, 9, 11, 12, 13,
15, and 16, Bordeaux 3-3-100 concentrate
plus oil 3 gallons. Plots 8, 10, 14, concen-
trate Mag-70, 24 pounds.

Where BHC is listed, it was used in pre-

Table 2. Apple scab tests in Pennsylvania, 1951

Stake:	Treatment through first cover,	June 15, 29, July 9, 21	Fruit scab : July 19-20 ^a :	Scab on Stay- man, Oct. 1	Scab on Black : Twig, Oct. 1	Mites per leaf, July
No. :	April 24, 30, May 14, 21,	June 1.	%	%	%	%
1.	Dilute Fermate-Sulfur		0.75	2.67	1.0	37.20
2.	Dilute Fermate-Sulfur		1.00	1.33	1.0	4.56
All other plots concentrate -- usually 3X						
3.	Fermate-Sulfur		5.00	8.32	13.0	35.68
4.	Fermate-Sulfur		6.25	7.0	8.0	13.68
5.	Mercury		11.75	5.0	14.0	35.84
6.	Mercury		4.25	10.0	10.67	8.00
7.	Mercury		0.50	3.5	2.33	21.75
8.	Mercury - BHC - Parathion		3.50	3.0	3.33	0.64
9.	Mercury		8.75	3.0	4.0	32.56
10.	Mercury - BHC - Aramite		5.00	7.33	8.0	0.56
11.	Phygon		13.50	11.67	26.0	47.12
12.	Phygon		13.50	2.67	17.67	16.08
13.	Phygon		28.30	16.67	56.5	52.64
14.	Phygon - BHC - Parathion		41.25	42.3	54.33	2.00
15.	34ISC		52.80	38.3	60.33	32.24
16.	34ISC		42.30	31.3	43.33	30.80

^a Later found to be counts on mixed Stayman and Black Twig.

* (2nd, 3rd, 4th covers).

pink only at 6 lbs. concentrate. Where parathion or Aramite is listed, they were used in petal-fall and 1st cover in concentrate at 6 pounds Aramite, or 1 1/2 pounds parathion.

Lead arsenate on all plots in petal-fall and 1st cover, and in 2nd cover on DDT plots, used at 3 pounds in petal-fall and 2nd cover and 4 pounds in 1st cover in dilute sprays, 3 times that amount in concentrate.

Russet (not bad year for this) Least to Most: Plots 15, 12, 4 and 16, 10, 5, 7, 2, 3, 9, 13, 1, on Red Delicious. On Stayman, Plots 16, 7, 12, 13, 8 and 6, 14, 5, 2 and 15, 4, 11, 9, 19, 1, 3.

Base Concentrations for Dilute Sprays -- Concentrates at 3 Times Amount Listed:

- (1) Fermate-Sulfur: 8 lbs. Magnetic-70 alone in prepink followed by Fermate 1 lb. plus Mag-70, 4 lbs.
- (2) Mercury: 1 pint Puratized Agricultural Spray.
- (3) Phygon: 1/2 lb. Phygon XL.
- (4) 341SC: 1 1/2 quarts.
- (5) Fermate (no sulfur): 1 lb.
- (6) Pheno-lead: 5 lbs. duPont's phenothiazine-lead arsenate mixture.
- (7) DDT: 2 lbs.
- (8) Orthocide: SR 406 - 2 lbs.

All pheno-lead plots received Fermate, DDT, and Aramite in 5th cover.

August 6, 6th cover, Plots 7 and 13: 341SC 4 1/2 quarts plus lime 3, plus parathion 3, plus Rhothane 3 qts. Plot 9: SR406 6 lbs. plus parathion 3, plus Rhothane 3 qts. Plots 1 and 2: Fermate 1 1/2, Parathion 1, Rhothane 1 qt. All other plots: Fermate 4 1/2, Parathion 3, Rhothane 3 qts.

Comments:

- (1) This orchard had an unusually heavy carryover of the scab fungus.
- (2) Half or more of the infections occurred during the June 9 to 14 period in the last half of the period between first and second cover. Thus, those treatments which were most effective as protectants or eradicants gave fair to good control.
- (3) The results with Phygon bear out previous experience here that 1/2 lb. is not sufficient with our customary spray timing. Control has been excellent with 3/4 lb.
- (4) Better scab control with dilute spray may have been due to the use of about 20 percent more chemicals per acre on those plots. The amount in all cases was relatively low.
- (5) Work with antifoaming agents with Fermate and 341SC mixtures should result in better control.

Pennsylvania, H. W. Thurston, Apple scab, russet, yield, gloss on Stayman, Grimes, Starking

Stayman -- Order of Disease Control

(percent of fruit scab): Phygon prebloom, Crag 341 post bloom (0.3 percent), Crag 341 all sprays (0.7), Tag prebloom, Crag 341 post bloom (0.8), Ferbam and Mag 70 sulfur 1.2, Mnbis (2.1)

Order of Plant Safety (percent russet):

(1) Crag 341, (2) Ferbam + Mag 70, (3) Tag prebloom, Crag 341 post bloom (3.5), (4) Phygon prebloom, Crag 341 post bloom (5.8)

Order of Plant Safety (gloss index): (1) Tag Crag 341 (100), (2) Mnbis (98), (3) Crag 341 (95), (4) Phygon-Crag 341 (87), (5) ferbam-Mag 70 (85).

Order of Yield (bu./tree): (1) Crag 341 (18.5), (2) Tag-Crag 341 (14.9), Phygon-Crag 341 (14.5), (3) Mnbis (13.4), (4) ferbam-Mag 70 (5.7)

Order Disease Control 1x vs 8x:

Lime-sulfur-Mag 70 -- Stayman 1x (0.9), 8x (9.0). Grimes 1x (0.1), 8x (1.0). Starking 1x (2), 8x (15).

Tag-Crag -- Stayman 1x (3.0), 8x (18.0). Grimes 1x (0.3), 8x (5.2). Starking 1x (4), 8x (2.9).

Order of Russet 1 x vs. 4x:

Lime-sulfur-Mag 70 -- Stayman 1x (10), 4x (5). Grimes 1x (36), 4x (44). Starking 1x (38), 4x (12). Gloss, Starking 1x (88), 4x (90).

Tag-Crag -- Stayman 1x (2), 4x (2). Grimes 1x (20), 4x (23). Starking 1x (14), 4x (2). Gloss, Starking 1x (100), 4x (98).

Percent Scab 1x vs 4x: Lime-sulfur-Mag 70 1x (0.7), 4x (14.3); Tag-Crag 1x (10.9), 4x (10.9); Crag 341 1x (1.6), 4x (14.0); 406 1x (2.8).

Percent Russet 1x vs 4x: Lime-sulfur-Mag 70 1x (8.2), 4x (2.5); Tag-Crag 1x (2.0), 4x (1.4); Crag 1x (3.3), 4x (0.9); Orthocide 1x (1.2).

Virginia, A. B. Groves. Apple scab on Rome and York.

Order of Disease Control: (1) Carbon and Carbide 5379 2 lbs.; (2) Shell XP 50 48 fluid ounces, Puratized Agricultural Spray 1 pint; (3) Aaventa 20 oz.; (4) Orthocide 406 2 lbs.; (5) C. and C. 5400. 2 lbs.

Order of Plant Safety: (1) Orthocide 406; (2) Puratized Agricultural; (3) Aaventa; (4) C. and C. 5379; (5) C. and C. 5400; (6) Shell XP 50.

Order of Preference: (1) 406; (2) Puratized; (3) 5400; (4) XP50; (5) 5379; (6) Aaventa.

C. and C. 5379 and 5400 produced sulfur-like scald in hot weather.

Aaventa Mathieson (Dutch origin), present formulation not satisfactory. Shell XP 50 produced some spray pattern type of injury where droplets dried.

Wisconsin, J. D. Moore and G. W. Keitt.
Apple scab on McIntosh.

Schedule: May 8, 17, 29; June 11, 26; July 6, 17.

"Data are not too accurate due to spotty crop and could not be analyzed statistically."

Order of Disease Control on Fruit: (1) Puratized Apple Spray 1/2 pint (2) ferbam 1-100 (2) (2.6 percent scab); L.S. 1-50 prebloom 1-60 post bloom (2.7 percent); LS 1-50, 1, Mike S 5-100 later (2.6 percent); LS 1-50, 1, 341SC 3 pts. after (3.1 percent); 341SC 3 pts. (3.4 percent); Tag 1/2 pt. (2) Ferbam (2) (3.3 percent); LS 1-50, 1, ferbam 1-100 later (4.2 percent). (2) LS 1-50, 1, 1-75 later (6.6 percent); LS 1-50, 1, ferbam 1/2 lb. + Mike S. 1/2 lb. later (9.7 percent); LS 1-50, 1, Microdritime S. 5 lbs. + Filmfast 1/2 lb. later (11 percent); Ferbam 1 1/2 lb., 1, 1 lb. later (13.7 percent). (3) Stanofide 1/2 pt. (26 percent)

Order of Disease Control on Leaves (n.s.d.): LS/microdritomic S (17 percent), LS 1-50/1-60 (17.2 percent) 341SC + lime (17.8 percent), LS 1-50/1/15 (18.3 percent), Puratized Fermate (20.3 percent), Tag 1 Tag-Fermate (22.7 percent), LS 1-50/Fer (23.8 percent), LS/341 SC (23.7 percent), Mag 70 + lime (30 percent), LS/Mike 3 (31.3 percent), Stanofide (35 percent), ferbam (39.7 percent), LS/Mike S + lime (41.8 percent).

Order of Safety to Leaves: (1) 341SC + lime (48.5), Tag/Fer (51.7), Fer (51.8) Puratized/Fermate (53.5), Mag 70 + lime (58.1). (2) LS/341SC, LS/Fer Mike S (98.5). (3) LS/microdritomic S + Filmfast (120.5), Stanofide (123.0). (4) LS 1-50/1-75 (148.6). (5) LS 1-50/1-60 (161.8).

British Columbia, M. F. Welsh and G. R. Thorpe, Apple scab on McIntosh and Delicious.

McIntosh protectants in prepink, pink, calyx, 2 covers. Eradicants immediately after infection periods (24 hours with over 70 percent relative humidity).

Order of Disease Control (summer fruit scab): (1) LS 1-50, ferbam-wettable sulfur 1-3-100, Crag 341C 1 qt. + lime 1/2 lb., Venturicide 3-100 followed by one cover Orthocide 406 2-100. (2) Orthorix 2 qt. -100 about 12 percent summer scab.

Order of Disease Control (pin-point scab): (1) ferbam + sulfur none. (2) 341C, Venturicide (trace). (3) LS, Orthorix.

Order of Plant Safety: (1) 341C, 406, ferbam/sulfur (100 percent scab). (2) LS, Orthorix.

Order of Preference (1) ferbam + sulfur. (2) 341C. (3) Venturicide. (4) LS. (5) Orthorix.

Orthorix not worth further trial (plant toxicity, cost). Venturicide, Lunevale Products, England, Leytosan Co., phenyl mercuric chloride. Eradicant plot received 2 after-infection sprays

(pink and late calyx X) followed by Orthocide.

Mites per leaf, average of 3 counts, June 11, 25 and July 10: LS 0.66, ferbam-sulfur 8.73, Venturicide-Orthocide 23.40, Orthorix 0.96, Crag 341C 9.97. (DDT and mite sprays omitted until mid-July), unsprayed check 10.84.

Third year of yield comparison on LS and ferbam-sulfur (4th year of spraying) LS 9.0 boxes per tree, ferbam-sulfur 15.2 boxes. Three-year average, LS 15.3, ferbam 19.5 boxes.

Delicious, same schedule as McIntosh.

Order of Disease Control (percent of summer scab): (1) LS, ferbam-sulfur, 341C, Orthorix (all approximately 7 percent scab). (2) Orthorix (13 percent)

Order of Disease Control (pin point scab): (1) ferbam-sulfur. (2) 341C, Venturicide. (3) LS, Orthorix.

Order of Preference: (1) ferbam-sulfur. (2) 341C. (3) Venturicide. (4) LS. (5) Orthorix

Yield Results 1951: LS 5.6 boxes per tree, ferbam-sulfur 9.7 boxes. Three-year average, LS 10.6 boxes, ferbam-sulfur 13.5 boxes.

Nova Scotia, J. F. Hockey and R. G.

Ross. Apple scab on Gravenstein, McIntosh
Schedule: 6 sprays, 1st bordeaux 5-10-100, 4 sprays of test materials, last spray bordeaux 3-10-100 (Imperial gallons).

Gravenstein

Order of Scab Control (percent fruit scab): Phygon 1-100 (0.8 percent), Phygon 1-100 (after rain) (1 percent), Crag 341C 1 qt. -100 (3.4 percent), SR 406 2-100 (4.7 percent), Mag 70 9-100 (5.6 percent), Crag 341 1 1/2 qt. -100 (8.2 percent)

Order of Plant Safety: (1) Crag 341, Mag 70; (2) 341C, 406; (3) Phygon 1-100 (protectant), Phygon 1-100 (after rain).

Order Over-all Preference: (1) 341C; (2) Mag 70, 406; (3) Crag 341; (4) Phygon protectant schedule and Phygon eradicator schedule.

"Phygon caused some russetting, both deep and net to the McIntosh fruit. It also caused a slight mottling to the foliage of both varieties."

McIntosh

Order of Scab Control (percent fruit scab): (1) Phygon (3 percent). (2) Crag 341C (6.6 percent). (3) Crag 341 (16.5 percent)

Order Plant Safety: (1) Crag 341. (2) Crag 341C. (3) Phygon.

Order of Preference: (1) Crag 341C. (2) Crag 341. (3) Phygon.

Ontario, G. C. Chamberlain, McIntosh, apple scab.

Schedule: delayed dormant-1, prepink, pink, calyx, three covers. (Imperial gallons). After-rain sprays prepink to calyx followed by ferbam covers.

Order of Scab Control (percent of fruit scab): (1) Dynacide 10 oz. -100 (1.09 percent). (2) Tag 1 1/2 pt. -100 (3.97 percent), manganese carbamate 2-100 (4.41 percent). (3) Orthocide 406 2-100 (6.51 percent). (4) Phygon-MgSO₄ 3/4-100 (13.3 percent). (5) Mag 70 sulfur control plot (45.26 percent).

Order of Plant Safety: (1) Man. carb., Tag, Dynacide, 406. (2) Phygon

Order of Preference: (1) Man. carb., Tag, Dynacide. (2) 406. (3) Phygon

Protectant schedule in complete schedule.

Order of Scab Control (percent of fruit scab): (1) Mag 70 sulfur 9-100, 7-100 covers (1.36 percent), Colsul colloidal sulfur 40% 2-100, Mag 70, 7-100 covers (3.46 percent), Orthocide 406, 2-100 (0.35 percent). (2) Crag C 1qt. -100 (2.81 percent), Crag SC 1 1/2 qt. -100 (6.15 percent). (3) Kolofog 100, 4 1/2-100 (11.39 percent). Check (100 percent)

Order of Plant Safety: (1) Mag 70, Colsul, 406, Crag 341SC. (2) Kolofog 100 (russet). (3) Crag 341C (serious russet).

Order of Preference: (1) Mag 70, Colsul, 406; (2) 341SC; (3) Kolofog 100; (4) 341C.

New Materials: Colsul colloidal sulfur 40%, Fruit Growers Chemical Ltd. Port Mapoa, New Zealand. Dynacide, 10% phenyl mercury acetate, O. E. Linek Co., Clifton, New Jersey. Manganese ethylene bis dithiocarbamate 75% active.

OTHER APPLE DISEASES

Indiana, J. R. Shay. Black pox (*Helminthosporium papulosum* Berg) on Gallia and Golden Delicious.

Gallia

Order of Disease Control: (1) Mn E Bis 2 lbs. 1st and 2nd cover, 1 1/2 lbs. 3rd and 5th (14.6 percent). (2) Dithane D14 1 1/2 qt., + ZnSO₄ 3/4 lb. 2nd cover, + 1/2 lb. FeSO₄ 3rd + 5th cover (30.4 percent). (3) 341 1 1/2 qt. 1st and 2nd cover, 1 qt. 3rd and 5th cover (67.8 percent). (4) Sulfur 8 lbs. 1st cover (May 24), 6 lbs. 2nd, 3rd and 5th covers (June 7, 19, July 25), (93.6 percent). No injury with four fungicides on Gallia.

Golden Delicious

Order of Disease Control: (1) Dithane (86.7 percent). (2) Mn E Bis (93 percent). (3) 341 (97.4 percent). (4) Sulfur (98.8 percent).

Order of Plant Safety (total percent russet): (1) Sulfur (71.4 percent). (2) Mn E Bis (99.7 percent). Dithane D-14 (99.1 percent). 341 (100 percent). Percentage of total in severe

class: (1) sulfur 40.4, (2) MnBis (59.8), (3) Dithane (75.3), (4) 341 (86.1). "Poor test since fungicides were omitted in 4th cover on July 5. 341, Mn E Bis, and Dithane were mighty rough on Golden Delicious fruits"

Missouri, H. G. Swartwout. Fire blight on Jonathan and Golden Delicious.

Order of Blight Control: (1) bordeaux 1 1/2-3-100 (good control), (2) Dithane D14 2 1/2 qts. + zinc sulfate 1 pound + Triton B 1956 1 ounce (no better than fair control), (3) Dithane Z-78 + Triton B1956 1 ounce (fair).

"Untreated controls were heavily but not severely blighted."

Order of Plant Safety: (1) the Dithane materials caused little or no russet on Jonathan and Golden Delicious, (2) bordeaux caused moderate russetting on Jonathan and heavy russetting on Golden Delicious.

Missouri, H. G. Swartwout, sooty blotch and fly speck on Golden Delicious, 2nd through 6th cover

Order Disease Control (percentage U.S. No. 1 fruit 9/28): (1) ferbam + lead arsenate 1/4-1-100 (99.7 percent), lead arsenate-zinc-lime 3-1-1-100 (98.3 percent). (2) Ferbam 1-100 (79.5 percent). (3) Orthocide 406 1-100 (43.3 percent). (4) DN 111 1-100 (10.2 percent). (5) Nabam-ZnSO₄ 2 qt. -2/3-100 (6.6 percent), zinc-lime 1-1-100 (5.8 percent). (6) Phygon XL 602-100 (2.4 percent). Check 0.0 percent

No foliage injury.

(1) No fruit injury from 406, DN111, lead arsenate + Zn-lime or lead arsenate and ferbam, (2) some from ferbam, (3) considerable from Phygon and from nabam plus ZnSO₄.

Missouri, H. G. Swartwout, sooty blotch and fly speck on Rome apple.

Order of Disease Control (1 percent fruit free from sooty blotch and fly speck): (1) ferbam 1 1/2-100 4 covers (81.1 percent); (2) ferbam 1 1/2-100 3 covers (40.2 percent); (3) sulfur 6-100 and 4-100 4 covers (25.9 percent); (4) sulfur 6-100, 4-100 3 covers (16.3 percent); Check 13.0 percent.

No injury.

Missouri, H. G. Swartwout. Sooty blotch eradication on Golden Delicious, Red Delicious, Ben Davis.

DN111 1 1/2 lb. + Triton B1956 1/2 oz., and 1 oz.

Orthocide 406 1 1/2 lb. + Triton B1956 1/2 oz. and 1 oz.

Lead arsenate 1 1/2 lb. + ferbam 1/4 lb. + 1 oz. 1956.

Bordeaux 1 1/2-1 1/2-100 + 1 oz. 1956 alone and + DN111 1/4 lb. with 1 oz. B1956.

Sprays began when first spots or light film of blotch appeared; 3-4 sprays at 10-day intervals. All materials effective. More effective with 1 ounce B1956 than with 1/2 ounce; removed light film, ineffective after film of blotch darkened.

"Only bordeaux caused injury. Foliage injury from bordeaux. B1956 combination was severe on Golden Delicious and moderately heavy on several other varieties including Red Delicious, Jonathan, and Ben Davis. Injury was so great that the bordeaux sprays were discontinued after the second spray."

Missouri, H. G. Swartwout. Sooty blotch on Golden Delicious.

Early cover sprays of wettable sulfur much less effective than early cover sprays of ferbam (both where 3 and 4 cover sprays were used). Sulfur and ferbam were the only fungicides and parathion only insecticide. As in past several years lead arsenate in calyx and 1st two cover sprays delayed onset of blotch and checked late development. "It did not provide adequate protection to harvest where conditions were highly favorable for sooty blotch."

Order of Black Control (protective schedule): (1) lead arsenate 3 lbs. + 1-1-100 powdered zinc sulfate lime, lead arsenate 1-100 + ferbam 1/4 lb., (2) ferbam 1-100; (3) Orthocide 1 lb.; (4) DN111 1-100; (5) Phygon XL 602-100; (6) Dithane D14 3 pints plus 2/3 lb. powdered zinc sulfate; (7) ferbam Cuprocide, split schedule ferbam Cuprocide.

Lead arsenate combinations gave best control and least damage to finish. Orthocide shows most promise of the organics.

North Carolina, H. C. Fink and C. N. Clayton. Black rot, bitter rot, and fruit spot on Red Delicious, Golden Delicious, Stayman, Rome Beauty.

Order of Disease Control (black rot):

Red Delicious -- (1) Phygon-ferbam, 406; (2) sulfur-bordeaux (2 percent); (3) 341 (4 percent); check 1 percent.

Golden Delicious -- (1) 341 (5 percent), sulfur-bordeaux (5 percent), 406 (6 percent); (2) Phygon ferbam (10 percent).

Stayman -- (1) 406 (2 percent); (2) 341 (4 percent), sulfur-bordeaux (4 percent); (3) Phygon-ferbam (6 percent).

Rome -- (1) 406 (1 percent); (2) sulfur-bordeaux (3 percent), 341 (5 percent), Phygon-ferbam (5 percent)

Order of Disease Control (percent of black rot in drops):

Red Delicious -- (1) 40.6 (80 percent), sulfur-bordeaux (82 percent), Phygon-ferbam

(84 percent), 341 (92 percent).

Golden Delicious -- (1) 406 (72 percent); (2) sulfur-bordeaux (81 percent); (3) 341 (96 percent); (4) Phygon-Fermate (100 percent).

Stayman -- (1) Phygon-ferbam (65 percent); 341 (69 percent); (2) sulfur bordeaux (80 percent), 406 (55 percent); (2) 341 (67 percent); (3) Phygon-ferbam; (4) sulfur bordeaux (82 percent).

Order of Disease Control (bitter rot in drops):

Red Delicious -- (1) none in 406, and sulfur-bordeaux, Phygon (1), 342 (2). Check 0.

Golden Delicious -- (1) Phygon-ferbam (0). (2) 341 (3), 406 (4). (3) Sulfur-bordeaux (7).

Stayman -- (1) 406 (3), sulfur-bordeaux (3); (2) 341 (8); (3) Phygon-ferbam (13).

Rome -- (1) Phygon-ferbam (3), sulfur-bordeaux (4), 406 (4), 341 (6)

No Brooks fruit spot on any sprayed plots. Checks: Red Delicious (0), Golden Delicious (0), Stayman (57 percent), Rome Beauty (54 percent).

At harvest unsprayed Rome fruits 16 percent black pox. Almost none on sprayed fruits.

Black rot, bitter rot, russet on Golden Delicious.

Order of Disease Control, black rot: 406 (0.7), Tag-341 (1.3), Puratized, 406, Man. Carb. (1.7), dry lime sulfur, sulfur-ferbam, ferbam (2.2), Phygon-Cop-O-Zink, Phygon (3.3), Check 72.2.

Order of Disease Control, bitter rot: 406 (0), 406-Man. Carb. (0.2), dry lime sulfur, sulfur-ferbam, ferbam (0.3), Tag 341 (0.6), Phygon-Cop-O-Zink, Phygon (0.5), Check (92.7).

Schedules:

Tag 1/2 pt. -100, prepink and pink; 341-lime 1.5 qts. 5-100, calyx and 5 cover sprays.

Puratized Agricultural Spray 1 pt. - 100 prepink and pink; 406 2-100 calyx; manganese ethylene bis dithiocarbamate 1 1/2-100, 5 covers.

Dry lime sulfur 15-10 prepink and pink; Mike sulfur ferbam 3-1-100 in calyx and 2 covers; ferbam 1 1/2-100 in 3 covers.

406 2-100 through pink.

North Carolina, H. C. Fink and C. N. Clayton. Blackrot, bitter rot, and russet on Golden Delicious.

Order of Disease Control, black rot: 406 (0.7), Tag-341 (1.3), Puratized-406-Man. Carb. (1.7), dry lime sulfur, sulfur-ferbam,

ferbam (2.2), Phygon-Cop-O-Zink, Phygon (3.3), Check 72.2.

Order of Disease Control, bitter rot; 406 (0), 406-Man.-carb. (0.2), dry lime sulfur, sulfur-ferbam, ferbam (0.3), Tag 341 (0.6), Phygon-Cop-O-Zink, Phygon (0.5), Check (92.7).

Schedules:

Tag 1/2 pt. -100, prepink and pink; 341-lime 1.5 qts. 5-100, calyx and 5 cover sprays.

Puratized Agricultural Spray 1 pt. 100, prepink and pink; 406 2-100, calyx; manganese ethylene bis dithiocarbamate 1 1/2-100, 5 covers.

Dry lime sulfur 15-100, prepink and pink; Mike sulfur-ferbam 3-1-100 in calyx and 2 covers; ferbam 1 1/2-100 in 3 covers.

406 2-100 throughout.

Phygon XL-sticker 3/4-202-100, prepink, pink, 1st cover; Cop-O-Zink-lime 2-2-100, calyx and 4 covers.

In all programs but dry lime sulfur thiophosphates used in 2 sprays, and lead arsenate in 4 dry lime sulfur plots and 8 lead arsenate sprays.

Order of Plant Safety:

Percent area with russet: (1) 406 (3 percent), Puratized-406-man. carb. (4 percent), Tag-341 (5 percent); (2) dry lime sulfur, sulfur-ferbam, ferbam (14 percent).

Color: (1) 406 (excellent); (2) Tag-341, Puratized-406-Man. carb. (good to excellent); (3) dry lime sulfur, sulfur-ferbam, ferbam (poor), Phygon-Cop-O-Zink, Phygon (poor).

North Carolina, J. F. Fulkerson and C. N. Clayton. Bitter rot and black rot on Grimes Golden, Stayman, Winesap, Golden Delicious, Delicious.

Order of Bitter Rot Control (percent of infected fruit):

Grimes Golden -- (1) Orthocide 406 2-100 1 percent, flotation sulfur paste 12-100 petal fall and 2 covers, bordeaux in last 5 covers 5 percent, check 16 percent.

Stayman -- 406 1 percent, bordeaux 1 percent, Check 2 percent.

Winesap -- 406 none, bordeaux none, check 2 percent.

Golden Delicious -- 406 none, bordeaux 1 percent, check 23 percent.

Red Delicious -- 406 1 percent, bordeaux 2 percent, check 2 percent.

Order of Black Rot Control (percent of fruit):

Grimes -- (1) 406 58 percent, (2) bordeaux 74 percent, check 73 percent.

Stayman -- Bordeaux 28 percent, 406 31 percent, check 39 percent.

Winesap -- 406 17 percent, bordeaux 17 percent, check 35 percent.

Golden Delicious -- Bordeaux 24 percent, 406 26 percent, check 38 percent.

Red Delicious -- (1) bordeaux 16 percent, (2) 406 20 percent, check 19 percent.

Necrotic spotting of leaves of Red Delicious in particular and of other varieties to a lesser extent occurred following one spray of 406.

North Carolina, C. N. Clayton and J. F. Fulkerson. Bitter rot, black rot, cracking on Golden Delicious, Stayman.

Order of Bitter Rot Control (percent of fruits):

Golden Delicious -- (1) Flotation sulfur paste 12-100 bordeaux 2-4, 3-4, 4-8 (0.6 percent); (2) Dithane D-14 + ferric sulfate 1 1/2 qt. -3/4-100 (1.8 percent); Orthocide 406 2-100 (1.7 percent) Phygon XL + U. S. Rubber Fung. Sticker 1-1/4-100 (1.6 percent); (3) ferbam 1 3/4-100 (2.1 percent); (4) Crag 341 + lime 1 1/2 qt. -1/2-100 (3.5 percent); (5) Manganese ethylene bis dithiocarbamate 1 1/2-100 (4.4 percent).

Stayman -- (1) Phygon (0.6 percent); (2) bordeaux (1.5 percent); ferbam (1.4 percent); (3) Dithane + Fe (2.4 percent); (4) 406 (3 percent), Mn. bis (3.7 percent); (5) 341 (5.5 percent).

Order of Black Rot Control (percent of fruit):

Golden Delicious -- (1) 406 17.6, Phygon 18.4, Mn. bis 19.2, 341 19.7, bordeaux 20.0, ferbam 20.3. (2) Dithane-Fe 32.7. Check 40.

Stayman -- (1) Bordeaux 24.8. (2) 406 31.1. (3) Dithane-Fe 35.6, Phygon 30.5, M-bis 40.2. (3) Ferbam 44.5, 341 47.3. Check 48.2.

Order of Cracking (Stayman): (1) 406 (16.7), bordeaux (17.1); (2) 341 (32.5) M-bis (35.7), ferbam (35.8), Phygon (37.8), Dithane (38.6).

Order of Plant Safety (russet on Golden Delicious): (1, very slight) 406, M-bis, Phygon (spotting, delay in ripening), check. (2, slight) ferbam (conspicuous lenticels). (3, moderate) Bordeaux, 341. (4, severe) Dithane-Fe (conspicuous lenticels).

Oregon, J. R. Kienholz, Gloesporium perennans fruit rot on Newtown and Spitzenberg. Schedule July 25, September 18.

Disease Control: Newtown data not yet available for disease control. On Spitzenberg: (1) Phygon 3/4-100, 50 percent reduction of rot (2). OS-377B 2 qts. -100 poor control.

Order Plant Safety: (1) ziram 1 1/2-100, Orthocide 406 2-100, OS-377B 2 qts. -100 (all safe); (2) copper dimethyl dithiocarbamate safe on Spitzenberg but caused red spots on Newtown. Phygon 3/4-100 safe on Spitzenberg but caused black spotting on Newtown.

Washington, R. Sprague, Powdery mildew on Jonathan and Black Jen.

Schedule: pink calyx, 1 to 4 covers 2-week intervals.

Order of Mildew Control: (1) Lime sulfur 2 1/2-100 pink, 2-100 calyx; (2) 3579 2-100 3-6 sprays; (3) Niagara polysulfide (1.2 lbs. = 1 gal. liquid); (4) wettable sulfur 3-100 3 sprays; (5) Manganese carbamate 2-100 4 sprays; (6) Vancide 51 4-100, 5 sprays.

Recommended schedule, lime sulfur 2 1/2-100 dilute or up to 4x with 20 percent less acre dosage for the pink, lime sulfur 2-100 calyx, wettable sulfur 3-100 14-17 days after calyx. Niagara polysulfide may be substituted for 1st 2 sprays, 3-100 in pink, 2 1/2-100 in calyx. When available will recommend 5379 at 1st and 2nd cover. Sulfur in 2nd cover is risky. 5379 also looks good on pear and cherry but less so against peach mildew.

PEAR DISEASES

Washington, R. Sprague. Fire blight on Bartlett pear.

Sprays: (1) 60 percent open April 18, (2) May 2, (3) May 18, (14) June 11.

Dusts: (1) April 21, (2) May 4, (3) June 18.

Treatments on single rows of 7-12 trees, alternate rows were checks. On August 16 all check rows contained 1 to 5 blighted branches. Only basic CuSO_4 2-100 showed single blighted branch. The following materials were also used: bordeaux 1/2-1-2-100, monohydrated 20% copper-lime dust 60-80 lbs. per acre, 5379 2-100, Cop-O-Zink 2-100, Parzate 1 1/2-100, Tersan 1 1/2-100 (3 sprays), Tag 1/2 pint-100 (3 sprays). Yields were compared with checks on each side. Bordeaux 1/2-1-2-100 did not depress yield very much in 1951 but some other copper sprays seemed to be more depressing on yield. The basic CuSO_4 caused some leaf injury also.

The copper dust did not appreciably depress yield. Trees with Parzate yielded slightly more than adjoining checks. 5379 and Tag caused most of fruit to drop while Tag caused a permanent brown discoloration and stunting of the leaves. Both materials were applied during freezing weather which probably accounts for the unusual injury, at least with 5379. "Tag XX is known to be sometimes injurious to pears but is also said to have bactericidal value."

Parzate, bordeaux, and copper dust are worth further consideration. Dust is easily applied and is not expensive. It also tends to check pear mildew. Parzate does not check mildew but there is no appreciable danger of injury as there always is with coppers in the Wenatchee area. Parzate could probably be applied by plane.

Washington, R. Sprague, fire blight on Bart-

lett pear.

Schedule: blossom time, 2 and 4 weeks later.

Order of Disease Control: (1) Nabam 1 1/2-100, bordeaux 1/2-1/2-100, 20-80 copper lime dust 60 lbs./acre. (2) Cop-O-Zink 2-100. (3) Tersan 1 1/2-100, 5379 1 1/2-100. (4) Basic copper sulfate 2-100, Tag 1/2 pint-100.

Order of Plant Safety: (1) Nabam; (2) bordeaux, copper-lime dust; (3) basic copper sulfate; (4) Tersan; (5) Cop-O-Zink; (6) 5379; (7) Tag.

Order of Yield: (1) Nabam; (2) bordeaux; (3) copper dust; (4) Tersan; (5) basic CuSO_4 ; (6) Cop-O-Zink; (7) Tag; (8) 5379.

5379 was applied when trees were covered with a heavy frost (about 20° F. April 19). No injury has been noted before or since on apples, pears, peaches or cherries. Tag also caused fruit drop. Cop-O-Zink caused slight to moderate russeting at 2-100. Tersan 1 1/2-100 caused no apparent injury (75% active).

Iowa, O. F. Hobart and W. F. Buchholtz. Fabraea leaf spot on pear seedlings. Seven sprays June 12-August 31, 10-day intervals.

Order of Disease Control (percent of diseased leaves): (1) bordeaux 8-8-100 (15.6), tri-basic copper 4-100 (16.5). (2) Phygon XL 2-100 29.7, Puratized Agricultural spray 1 pt.-100 (32.6). (3) Orthocide 406 2-100 (48.5). (4) 341C 1 quart-100 (57.3), 341SC 1 1/2 qt.-100 (58.6), Dithane D-14 2 qt.-100 (58.3), ferbam 1 1/2-100 (60.1). (5) Sulfuron 4-100 (67.9). (6) Dry lime sulfur 6-100 (97.8). Check 99.5 percent.

PEACH DISEASES

Washington, R. Sprague "Improved" Elberta peach, powdery mildew.

Order of Disease Control: (1) Magnetic 70 paste sulfur 4-100; (2) Kolofog 100 3 1/2-100; (3) Vancide 51 + Multifilm 4-302-100; (4) 4279 2-100; (5) 5400-100; (6) ferbam 1 1/2-100.

Order of Plant Safety: (1) Mag 70, ferbam; (2) 5379, Kolofog 100; (3) 5400; (6) Vancide 51.

Order of Preference: (1) Mag 70; (2) Kolofog 100; (3) 5379; (4) 5400; (5) ferbam; (6) Vancide 51 (shot hole).

Vancide 51 (R. T. Vanderbilt Co.) caused shotholing when used with 302 of Multifilm. Should be tried without Multifilm; suspect the oil caused the shotholing. Materials not worth further trial, 5379 and 3400.

North Carolina, C. N. Clayton, Elberta peach, bacterial spot, brown rot.

Order of Disease Control (percent bacterial spot): Cop-O-Zink (1), zinc + lime + sulfur (16), Vancide + Kolofog (16), 406 (20), sulfur (31), lime + sulfur (65), MgO + sulfur (87).

Order of Index of Severity of Bacterial Spot: (1) zinc + lime + sulfur (2), Cop-O-Zink + lime (2), 406 (6). (2) Sulfur (11). (3) Lime + sulfur (20). (4) MgO + sulfur (30). L.S.D. .05 = 5, .01 = 8.

Order of Brown Rot Control (percent of brown rotted fruit (harvest)): 406 (17), Cop-O-Zink + lime (26), lime + sulfur (33), zinc + lime + sulfur (36), MgO + lime (36), sulfur (41), Vancide + Kolofog (48).

Materials: 12 sprays except sulfur 6 sprays --

406 2-100

ZnSO₄ (36% Zn) + hydrated lime + wettable sulfur 4-4-4-100

Hydrated lime + wettable sulfur 25-4-100

Magnesite (MgO) + wettable sulfur 12 1/2-4-100 (MgSO₄ + lime + wettable sulfur 4-4-100 used in 1st spray).

Vancide 51 + Kolofog 1 pt. -6-100 (2 pt. -6-100 in last 3 sprays)

Wettable sulfur 6-100 only in 6 regular sprays.

Parathion 1 1/2-100 included in all treatments in 4 sprays.

Bacterial spot was relatively less severe than usual in 1951 owing to the drought of April, May, and June. Bacterial spot on foliage was not affected by sprays. More bacterial spot occurred with high dosages of lime or Magnesite. These were not finely ground, and may have caused minute injuries in which bacterial infections occurred.

Brown rot was very severe before end of harvest. Blossom blight (0.1 percent) was present on all trees. Drought held rot in check until near harvest. 406 was most effective, Cop-O-Zink and lime + sulfur next.

Cop-O-Zink caused some shotholing of leaves, purpling of dorsal leaf surface, and about 1 percent defoliation by early May, which intensified later. By early July 10 to 20 percent defoliation, rest of leaves badly shotholed. Foliage in late August was slightly yellower than with other treatments. No injury with other treatments. Fruits showed excessive residues with lime sulfur, very attractive finish with 406; Cop-O-Zink fruits showed a yellow color.

South Carolina, H. H. Foster, J. H. Hale variety, brown rot.

Order of Disease Control: (1) wettable sulfur 6 lbs. (4.7 percent rot), Orthocide 2 lbs. (5.0), duPont's manganese ethylene bis dithiocarbamate (5.6); (2) wettable sulfur 4 lbs. (11.4), Rohm & Haas Dithane D-14 1 1/2 qts. +

ferric sulfate 6/10 lb. (15.8), General Chemical 1189 (50% wettable) 3 lbs. (16.1); (3) Rohm & Haas CR2379 2 lbs. (44.7); (4) dispersible sulfur (50% wettable) 3 lbs. (68.5), H. T. H. calcium hypochlorite (70%) 1/2 lb. (82.6), Parathion 1 1/2 lbs. (60.6).

Order of Plant Safety: (1) wettable sulfur 4 lbs., 6 lbs., dispersible sulfur, 1189, 406 (none); (2) 2379 (slight), hypochlorite (slight); (3) manganese (moderate bronzing); (4) Dithane (moderate to severe).

Fungicides not worthy of further trial: dispersible sulfur at the rate used, 1189, CR2379, Dithane and ferric sulfate, calcium hypochlorate.

Parathion used with all fungicides except 1189. In last 2 sprays wettable sulfur substituted for 1189. Dithane ferric sulfate plots received wettable sulfur 6 lbs. in last 2 sprays owing to dark off-color of peaches.

Peaches sprayed with 406 usually showed better color than fruits sprayed with wettable sulfur.

Missouri, H. G. Swartwout, Carman, Belle varieties, brown rot.

Microfine wettable sulfur parathion used in 2 schedules (1) all season beginning with bloom spray and continuing until 2 weeks before harvest (August 13). (2) Same schedule except pre-harvest sprays beginning one month before picking were omitted. Last spray was July 13.

Both programs gave better than 99 percent control. Because of dry weather during bloom blossom blight was negligible. Unsprayed checks showed 9.8 percent and 14.9 percent brown rot for Carman and 18.9 percent and 31.9 percent for Belle. Unsprayed trees were moderately damaged by insects. No cat-facing, curculio or fruit moth in sprayed fruit.

Missouri, H. G. Swartwout, peach scab on Carman, Belle.

Lead arsenate 1 1/2-100 with zinc lime gave excellent control of peach scab. Control was better than with microfine sulfur 2-100. However, the lead arsenate/zinc-lime caused considerable foliage and fruit injury.

DDT, BHC, methoxychlor and parathion are not effective against peach scab.

It is evident that lead/zinc-lime sprays were a factor in scab control. Since the organic insecticides are ineffective more attention to fungicides for scab control will be required.

California, E. E. Wilson and W. H. English, Royal Apricot brown rot (*Monilinia laxa*)

Order of Disease Control (number of

blight blossom clusters per 50 branches): (1) Phygon XL 3/4-100 (3), Dithane D14 2 qt. + ferric sulfate 12 oz. -100 gal., home-made ferric dimethyl dithiocarbamate (3). (2) Bordeaux 10-10-100 (6), Tag 1/2 pint-100 (6), Orthocide 406 2-100 (6), Carbon and Carbide 640 1 1/2-100 (8). (3) Puratized Agricultural Spray 1 pint-100 (14), ferbam 2-100 (16). (4) 341C 2 pints + 1/2 lb. lime (24). (5) Check (34).

Sprays: (1) red bud, (2) 20-40 percent blossoms open February 22-23, March 10.

CHERRY DISEASES

Missouri, H. G. Swartwout, leaf spot on sour cherries.

Order of Leaf Spot Control: (1) bordeaux 2-3-100 in first spray, 3-4-100 in second, gave longest protection. (2) Cycloheximide (Actidione), best protection for 1st 2 months after last spray, then leaf spot developed rapidly causing defoliation in a few weeks. (3) Ferbam 1 1/2-100 + yellow cuprous oxide 4 ounces, third in duration of protection. (4) Ferbam 1 1/2-100 + copper ammonium silicate 3/4 lb. and ferbam 1 1/2-100 alone, good protection for the shortest period.

Order of Mildew Control: (1, no mildew) ferbam/yellow cuprous oxide, Actidione, bordeaux; (2, light) ferbam/copper ammonium silicate; (3, considerable) ferbam.

Order of Plant Safety: (1) ferbam (no injury); (2) ferbam/copper ammonium silicate (very light); (3) ferbam/yellow cuprous oxide (slight browning on underside of leaves -- light injury), Actidione (some injury -- a chlorosis and slight hardening of leaves); (4) bordeaux (5 percent of leaves yellowed and fell from copper injury and a high percentage of remaining leaves showed considerable discolored areas on the underside).

Wisconsin, J. D. Moore and G. W. Keitt. Montmorency cherry, leaf spot.

Order of Leaf Defoliation August 29-September 1:

(1) Dithane D-14 1 quart + ZnSO_4 1/2 lb. 1, 2, 2A, 3 (23), Dithane D14 1qt. + $\text{Fe}_2(\text{SO}_4)_3$ 1/2 lb., 1, 2, 2A, 3 (31).

(2) Bordeaux 6-8-100 1 ferbam 2, 2A, 3 (45), COCS/lime 1 1/2 3-100 1, 2, 2A, 3 (52), ferbam 1 1/2-100 1, 2, 2A, 3 (52), 341SC 1 qt. + lime 1/2 lb., 1, 2, 2A, 3 (54).

(3) Cop-O-Zink/lime 3-3-100 + Orthex 1 pt. 1, 2, 2A, 3 (73), bordeaux 6-9-100 1 341B 2, 2A, 3 (80), bordeaux 6-8-100 1 bordeaux 3-4-100 2 Ferbam 1 1/2 lb. 2A, 3, (81), Tenn. 34/lime 3-3-100 + Orthex 1 pt. 1, 2, 2A, 3 (86), bordeaux 6-8-100 1 Tenn 34/lime 3-3-100 + Orthex 1 pt. 2, 2A, 3 (92), 341B 1 1/2-100 1, 2, 2A, 3 (114) bordeaux 6-8-100, 3-4-100 2, 2A, 3 (100),

bordeaux 6-8-100 1, 2, 3 (112).

Order of Leaf Spot Control:

(1) Bordeaux 6-8, 1, 3-4, 2, 2A, 3 (15), bordeaux-Tenn. 34 (35).
(2) Dithane + Zn (46).
(3) Tenn. 34 (51), Cop-O-Zink (86).
(6) Bordeaux 6-8, 1, Ferbam 2, 2A, 3 (109), Dithane + Fe. (111).
(7) COCS. (132).
(8) Ferbam (131), 341SC (163).
(9) Bordeaux 6-8, 1, 341B 2, 2A (181).

(10) 341B (185).

Order of Weight 100 Fruits:

(1) ferbam (421), Dithane + Zn (417), Tenn. 34 (416), 341B (408), COCS (406), Cop-O-Zink (404), 341SC (407).

(2) Dithane + Fe (392), bordeaux 6-8 1 341B 2, 2A 3 (381), bordeaux 6-8, 1, 2, 3, (377), bordeaux 6-8, 1, ferbam 2, 2A, 3 (371), bordeaux 6-8, 1, Tenn. 34 1, 2, 2A, 3 (371).

(3) Bordeaux 6-8, 1, 2, ferbam 2A, 3, (365), bordeaux 6-8, 1, bordeaux 3-4, 2, 2A, 3, (358).

Order of Sugar Content (Brix at harvest):

(1) Bordeaux 6-8, 1, 3-4, 2, 2A, 3 (13.75).

(2) Bordeaux 6-8, 1, 2, 3 (12.83), Dithane + Zn (12.96), bordeaux 6-8 1, Tenn. 34 2, 3 (12.79), Tenn. 34, 1, 2, 2A, 3 (12.88), 341B (12.50), COCS (12.42), Dithane + Fe (12.67), Cop-O-Zink (12.54).

(3) Bordeaux 6-8, 1, ferbam, 2, 2A, 3 (12.29), ferbam 1, 2, 2A, 3 (12.29), 341SC (12.15), bordeaux 6-8, 1, 341B 2, 2A, 3 (11.92).

Best leaf spot control was on trees receiving only copper and poorest on those receiving only an organic fungicide. Mixed programs of copper and organic fungicide gave intermediate control except 10 Dithane + zinc sulfate which gave very good control and practically no spray injury at the time of after-harvest counts. A moderately heavy loss of leaves occurred about 10 days later. Because of spray injury bordeaux-sprayed trees had about as much defoliation as 341B that gave the poorest leaf spot control. Dithane/zinc was a better fungicide than Dithane/ FeSO_4 . Fermate was poorer yet. The most spray injury was on copper plots with more injury with bordeaux than with "insoluble" copper. In 1951 the best control with least injury was with Dithane plus zinc sulfate.

Can corrosion studies of 1951 will not be available until 1953. Results of cans placed at 70° F. in 1951 are not yet available. Most cans stored at 100° F. in 1951

had failed by 427 days after canning, time varied with sprays used. "Data are by no means conclusive, but present indications are that the 'can life' of fruits sprayed with a dithiocarbamate was shortened by 2 to 5 months of 100°F."

Data on frozen cherries are not conclusive. Until 1950 sugar was added. In 1950 half of cans received sugar. In 1951 no sugar was added. Results are not yet available.

Studies of effects of defoliation on winter hardiness have been inconclusive, in spite of striking differences in defoliation in 1950 preceding the extremely cold winter of 1950-51.

New York. J. M. Hamilton and M. Szkolnik. Dry stem (arsenical injury) on English Morello.

Micronized sulfur 6-100 + lead arsenate lime 1-1-100 applied to all trees at petal fall. Five sprays of materials listed were made.

Order of Plant Safety (percent of dry stem July 24): (1) unsprayed, 1 percent; Fermate 1 1/2-100 + Marlite 3-100, 1 percent; Orthocide 406 2-100 + Marlite 3-100, 1 percent. (2) Coposil 3-5 + lead arsenate 1-100, lead omitted in 1st 2, or 5 sprays, 2 of sulfur 7-100 and 3 of Coposil 3-5-100, 5 percent. (3) Fermate, lead arsenate, lime 1 1/2-1-100, 16 percent. (4) Crag 341B 2 lbs. + lead arsenate 1 lb. + lime 1 lb., 23 percent; COCS 2-4-100 + lead arsenate 1-100 22 percent. (5) Fermate lead arsenate 1 1/2-1-1-100, 29 percent.

Order of Plant Safety (percent of dry stem August 9): (1) Unsprayed 5 percent; Fermate + Marlite 6 percent; 406 + Marlite 6 percent. (2) Coposil 16 percent. (3) Fermate-lead arsenate-lime 34 percent. (4) Fermate-lead arsenate 46 percent. (5) COCS-lead arsenate 54 percent; 341B-lead-lime 56 percent.

GRAPE DISEASES

Missouri, H. G. Swartwout. Black rot on Concord Grape, 5 sprays from shoots 2 inches long to two weeks after bloom.

Order of Black Rot Control (1 percent infected fruit): Ferbam 1 1/2-100 + DDT (1.6), Ferbam 1 1/2-100 + lead arsenate (2.6), Orthocide 406 2-100 (3.0). Checks (52.1) and (57.3). No injury occurred.

Missouri, H. G. Swartwout. Black rot and downy mildew on grape.

Order of Black Rot Control: (1) ferbam 1 1/2 lb.; (2) Orthocide 406 2 lbs. (a little less effective). Neither caused any injury but Orthocide was more effective against downy mildew.

Order of Downy Mildew Control (protective schedule): (1) ferbam 1 1/2 lbs. + yellow cuprous oxide 44 ounces and 6 ounces; (2) ferbam 1 1/2 lbs. + copper ammonium silicate 3/4

lb.; (3) Orthocide 406 (good control during spraying period but shorter residual protection than bordeaux); (4) ferbam 1 1/2 lbs.

Order of Plant Safety: (1) ferbam, Orthocide; (2) copper ammonium silicate (no injury on Concord and Fredonia); (3) ferbam, yellow Cuproside (slight injury to Concord, none to Fredonia, serious to Catawba).

Order of Downy Mildew Control (eradication program): (1) Orthocide 2-100; (2) bordeaux 3-3-100 (some injury); (3) ferbam 1 1/2 Coposil 8 oz. (less effective but less injury); (4) ferbam 1 1/2 lbs. yellow Cuproside 402 (less effective but less injury); (5) ferbam 1 1/2-100 + copper sulfate 6 oz. (not effective in severe mildew, good control when mildew was moderately light).

Most fungicides were used with and without Triton B1956. It had questionable value.

New York, A. J. Braun. Downy mildew on Catawba grape.

Order of Disease Control: (1) bordeaux 16-16-100 (4x concentrate), 0.1 percent; 4-4-100, 0.1 percent. (2) Ferbam 6-100, 4.3 percent. (3) Check 18.6 percent.

Order of Plant Safety: (1) ferbam, (2) bordeaux concentrate, (3) bordeaux.

Order of Preference: (1) bordeaux concentrate, (2) bordeaux, (3) ferbam.

COCS (6% Cu) with and without lime, wet and dry, showed trace of mildew, no differences; 2-80 copper-lime 6%, wet and dry, also no differences. Check 7.3 percent mildew.

Results are not in accord with previous years.

Results with concentrates are very encouraging. Ferbam shows more promise for downy mildew than previously thought, could be used in pre-bloom sprays on varieties subject to both black rot and downy mildew, with a fungicide more effective against mildew in post bloom sprays.

Ontario, G. C. Chamberlain, Fredonia grape, downy mildew.

Schedule: Pre-bloom, fruit set, and 2 weeks later (Imperial gallons).

Order of Disease Control (percent of infected clusters): (1) Bordeaux 5-5-100, .85 percent; bordeaux 7 1/2-10-100, .92 percent; bordeaux 3 3/4-3 3/4-10, 1.02 percent; Orthocide 406 2-100, 0.77 percent; bordeaux (fruit-set spray omitted), 1.06 percent; bordeaux cover omitted, 0.68 percent. (2) Robertson's fungicide *(73% Cu) 1-100, 6.61 percent. (3) bordeaux (pre-bloom omitted), 11.83 percent. Check 17.5 percent infected clusters. No injury occurred.

Order of Preference: (1) Bordeaux 5-5-100, 7 1/2-10-100, 3 3/4-3 3/4-100 bordeaux

Table 3. Order of anthracnose control, lesions per cane. Ohio experiments. Counts made July 20.

	:	:	:	Lesions per
Delayed dormant	:	Prebloom	:	cane
	:		:	
Lime-sulfur 8-100	--	--	24.6	
Lime-sulfur 8-100	Ferbam 2-100	--	7.4	
Lime-sulfur 8-100	Ferbam 2-100	Ferbam 2-100	1.6	
Lime-sulfur 8-100	--	Ferbam 2-100	9.2	
--	Ferbam 2-100	Ferbam 2-100	13.0	
Lime-sulfur 8-100	MnEBD 2-100	(MnEBD 2-100 ?)	2.9	
Lime-sulfur 8-100	Ferbam-Phygon 1-1 1/2-100	Ferbam-Phygon	2.3	
Lime-sulfur 8-100	Orthocide 406 2-100	406 2-100	2.1	
Lime-sulfur 8-100	Crag 341 1 1/2 qt.-100	341 1 1/2 qt.-100	11.8	
--	--	--	79.3	
LSD .05				8.0
.01				10.7

fruit-set omitted, bordeaux 2-weeks omitted, Orthocide. (2) Robertson's. (3) Bordeaux pre-bloom omitted.

Downy mildew of fruit clusters moderate.

* Robertson's fungicide 19% cuprous oxide, 73% metallic copper, H. H. Robertson, Pittsburgh, Pa.

STRAWBERRY DISEASES

Illinois, D. Powell. *Botrytis cinerea* on Blakemore and Robinson strawberry varieties.

Schedule: April 23, first appearance of bloom, May 15, full bloom.

Order of Disease Control on Blakemore (percent of berries with rot): (1) ferbam 2-100, 10.0 percent; (2) bordeaux 4-6-100 23.6 percent; check 23.7 percent.

Order Disease Control on Robinson: (1) ferbam 2-100, 4.8 percent; (2) Orthocide 406 2-100, 6.6 percent; (3) bordeaux 4-6-100, 14.6 percent; check 11.6 percent.

Missouri, H. G. Swartwout, leaf spot and leaf scorch on strawberry.

Order of Disease Control: (1) Actidione 5 p.p.m., 10 p.p.m., 20 p.p.m., Dithane D-14 2 quarts plus zinc sulfate 1 lb.; (2) Orthocide 406 2-100 (most attractive berries); (3) bordeaux 6-6-100, Phygon XL 3/4-100 (poorest but better than check).

Order of Plant Safety: (1) 406, Dithane (no injury); (2) Actidione (trace to light injury according to concentration); (3) bordeaux (light to moderate injury); (4) Phygon (moderately heavy injury, enough to make it an undesirable material to use).

RASPBERRY ANTHRACNOSE

Ohio. H. F. Winter. Anthracnose of raspberry (see Table 3).

AVOCADO

California, G. A. Zentmyer and W. A. Thorn, Fuerte Fruit rot on Avocado (*Botryosphaeria ribis* (*Dothiorella*)). Fruit picked and disease reading made in January 1952.

Order of Disease Control: (1) Yellow Cuprocide 2 lbs. (10 lbs./acre). (2) Bordeaux 4-4-100 (40 lbs. CuSO_4 /acre). (3) Crag Fungicide 658 2 lbs. (10 lbs./acre). (4) Parzate 2 lbs. (10 lbs./acre), Orthocide 406 2 lbs. (10 lbs./acre)

No difference in safety or yield. Bordeaux residue objectionable.

Order of Preference: (1) Cuprocide, (2) 658, (3) bordeaux

CITRUS FRUITS

Florida, R. F. Suit. Melanose on Marsh grapefruit. 1 spray April 5, 1951.

Order of Disease Control (percent of No. 1 fruit): (1) Tribasic copper sulfate 1 1/2-100, 88.2 percent. (2) bordeaux 3-3-100, 86.5 percent. (3) Tribasic copper + PEPS 1 1/2 pt.-100, 84.6 percent. (4) Tribasic copper 1 1/2-100, 82 percent. (5) Tribasic copper 1-100, 81.1 percent. (6) Orthocide 406, 4-100, 73.1 percent, 2-100, 73.4 percent.

No difference in safety or yield.

California, L. J. Klotz, T. A. deWolfe, E. C. Calavan, J. R. Sufficool, and J. T. Middleton. Phytophthora brown rot on lemon.

Order of Disease Control: (1) Orthocide 406-4 lbs. (2) Crag 640 2 lbs. (3) bordeaux (homemade) 3-3. (4) Orthocide 406 2 lbs. + Z-1 spreader 1/4 lb. (5) ZnSO_4 Tag + CuSO_4 5 ag. + Ca(OH)_2 2-2-2. (6) duPont Copper A + Ca(OH)_2 + duPont Spreader Sticker 1 1/2-3-1/2. (7) COCS (Code R 72 Niagara) + Zn spreader 2-1/2. (8) Orthocide 406 2 lbs. (9) Zinc 20% copper 4% Fungorex + Citra Flo oil + S20 spreader (Leffingwell Co.) 8-1 qt. -3/8. (10) Crag 169 2 lbs. (11) Copper A + duPont Spreader Sticker 1 1/2-1/8. (12) Dithane D14 + $\text{Fe}_2(\text{SO}_4)_3$ 3/4 gal. -3/4-1 qt. (13) Orthocide 406 1 lb. (14) Crag 658 2 lbs. (15) ZnSO_4 CuSO_4 Ca(OH)_2 5-1-4. (16) Zinc Coposil (19 percent Cu, 19 percent Zn) Cal Spray. (17) Bordeaux 101. (18) Dithane D-14 + $\text{Fe}_2(\text{SO}_4)_3$ + ZnSO_4 7 ag. (19) AlCuFe Fungorex + oil + spreader 1/2 gal. -1/2-1/2. (20) Dithane D-14 + $\text{Fe}_2(\text{SO}_4)_3$ 9 ag. + ZnSO_4 7 ag. 1 gal. -1-1.

Order Plant Safety (leaves): (1) 406-4, 406 + 21 2 1/2, 406-2, 406-1. (2) Crag 169 (3) Fungorex-Citra Flo oil 3/4 gal. -3/4-1 qt. zinc copper lime 5-1-4. (4) Zinc-copper-lime. (5) Crag 640, Copper A-lime-sticker, Crag 658. (6) Bordeaux. (7) Copper-A-Sticker. (8) Dithane D-14 + Fe-Zn.

Over all Preference: (1) 406-4. (2) Crag 640. (3) 406 + spreader. (4) Zinc copper lime. (5) 406-2. (6) Copper A-lime-sticker, COCS-21, 406-1. (7) Fungorex Citra Flo, Crag 169, Crag 658. (8) Bordeaux. (9) Dithane D-14, Fe Zn sticker. (10) Copper A-spreader sticker.

California, E. C. Calavan, J. R. Sufficool Botrytis blossom blight of lemon. (1) spray during bloom April 20.

Order of Disease Control: (1) Dithane D-14 + $\text{Fe}_2(\text{SO}_4)_3$ 6 H_2O + duPont Spreader Sticker 1 gal. -1-3/8. (2) AlCuFe Fungorex* + oil + Leffingwell S-20 spreader 6-1 1/2 pts. -5/16, bordeaux + duPont spreader sticker 3-3-3/16. (3) Crag 658 + duPont spreader sticker 2-3/16.

Order of Plant Safety: (1) 658, (2) Fungorex, (3) bordeaux, (4) Dithane D-14 + Fe.

Order of Preference: (1) Dithane D-14 + Fe, (2) 658, (3) Fungorex, (4) bordeaux.

*AlCuFe Fungorex contains 6% copper (composed of hydroxides of aluminum, copper and iron).

NUT TREES

Georgia, J. R. Cole. Scab on Schley pecans. Seven sprays of regular schedule, dilute and mist concentration 5x.

Order of Disease Control: (1) Bordeaux 6-2-100 dilute. (2) Zineb-summer oil emulsion 2-1 qt. -100 dilute, ziram-oil 2-1 qt. -100, Orthocide 4-100. (3) Tag 1 pt. -100. Puratized Agricultural 1 pt. -100, Puratized Apple 1 pt. -100 (4) poor, ziram 10-100 (mist concentrate), Vancide 51 2-100 (dilute).

Order of Plant Safety: (1) Zineb, ziram dilute, and concentrate Vancide 51, Orthocide. (2) Tag, Puratized Agricultural, Puratized Apple.

Order of Yield: (1) Bordeaux. (2) Zineb, ziram/dilute, Orthocide 406. (3) Not suitable, Tag, Puratized Agricultural, Puratized Apple.

Not recommended: Ziram (conc.) Vancide 51, Orthocide

Oregon, P. W. Miller. Walnut bacterial blight on Franquette var. Persian Walnut. Schedule: (1) yearly prebloom, (2) late prebloom, (3) early post bloom.

Order of Disease Control: (1) Bordeaux 12-6-100 (semi 3x concentration); (2) bordeaux 4-2-100; (3) yellow Cuprocid 1-100; (4) yellow Cuprocid 3-100 (3x); (5) Crag 531*-2-100; (6) Manzate* 2-100.

Order of Plant Safety: (1) Manzate, (2) 531, (3) Cuprocid 1x, (4) Cuprocid 3x, (5) bordeaux 1x, (6) bordeaux 3x.

Order of Overall Preference: (1) Cuprocid (3x), (2) Cuprocid (1x), (3) bordeaux (3x), (4) bordeaux (1x), (5) 531, (6) Manzate.

*Crag 531 = Cadmium-zinc-copper calcium chromate. Manzate = Manganese ethyl bisdithiocarbamate.

Correction: In the report by P. W. Miller on walnut bacteriosis, Yellow Cuprocid (Rohm & Haas) and Copper Compound A (duPont) should have been listed by the writer as new fungicides under category 1 of the mimeographed summary sheet, not under category 3 of materials not worth further trial. The last line "which are not worth further trial" should be marked out on your 1950 summary -- (W. D. Mills).

SOIL TREATMENTS - 1951

Contributors Reporting

State	Contributor	Location of tests
California	M. W. Allen D. J. Raski	Berkeley
Colorado	N. R. Gerhold W. J. Henderson W. D. Thomas G. H. Lane James Twomey C. E. Seliskar	Conejos Co., Brush Conejos Co., Greeley Greeley, Rocky Ford Brush Greeley
Delaware	H. W. Crittenden	Bethel
Florida	Fred Clark George Swank, Jr.	Gainesville Sanford
Maryland	J. N. Sasser B. F. Lownsbery	Beltsville Beltsville
Massachusetts	Ralph W. Ames E. C. Gasiorkiewicz W. L. Doran	Waltham Waltham Amherst
South Carolina	T. W. Graham	Florence
Tennessee	J. O. Andes	Knoxville
Virginia	R. S. Mullin	Norfolk
Washington	Roderick Sprague	Wenatchee

LIST OF MATERIALS TESTED

Material	Active ingredient	Source
Agrox	phenyl mercury urea (4% mercury)	Chipman Chemical Co.
Arasan	50% TMTD	E. I. duPont de Nemours & Co.
CBP-55	chlorobromopropene	Shell Chemical Corp.
Ceresan M	7.7% ethyl mercury p-toluene sulfonanilide	E. I. duPont de Nemours & Co. Semesan Div.
Cold Smoke	1% nicotine, 5.6% barium	Cold Smoke Products Co.
Crag 658	copper zinc chromate	Carbide & Carbon Chemical Corp.
Crag 341	2-heptadecyl glyoxalidine acetate	Carbide & Carbon Chemical Corp.
Crag 5379	1, 2, 3-trithia-5, 8-diazocyclononi-4, 9-dithione 75%	Carbide & Carbon Chemical Corp.
D-D	dichloropropene-dichloropropane	Shell Chemical Corp.
Dow 9B	50% zinc 2, 4, 5-trichlorophenate	The Dow Chemical Co.
Dowfume MC-2	98% methyl bromide, 2% chloropicrin	The Dow Chemical Co.
Dowfume W-40	41% ethylene dibromide	The Dow Chemical Co.
DN-111	20% dinitro-o-cyclohexylphenol, dicyclohexylamine salt	The Dow Chemical Co.

Material	Active ingredient	Source
Dithane Z-78	65% zineb	Rohm and Haas Co.
Dithane D-14	19% nabam	Rohm and Haas Co.
F-531	thiocarbamate	E.I. duPont de Nemours & Co.
Goodrite ZAC	thiocarbamate	B.F. Goodrich Chemical Co.
Iscobrome D	32% ethylene dibromide	Innis, Speiden & Co.
Mathieson 275	25% pentachloronitrobenzene	Mathieson Chemical Corp.
Natriphene	sodium 2-hydroxydiphenyl	Natriphene Co.
Orthocide 406	50% N-trichloromethylthio tetrahydro-phthalimide	California Spray Chemical Corp.
OS-1199	18% technical dibromobutene	Shell Chemical Corp.
OS-1199(Powder)	25% technical dibromobutene	Shell Chemical Corp.
Oxy-Quin	8-hydroxy-quinoline benzoate	Wilson Chemical
Permacide	pentachlorophenol	Miller Products Co.
P-162	chlorinated hydrocarbon	Julius Hyman Co.
Phygon XL	50% 2, 3-dichloro-1, 4-naphthoquinone	U.S. Rubber Co.
Parzate	65% zineb	E.I. duPont de Nemours & Co.
Spergon	96% tetra chloro para benzoquinone	U.S. Rubber Co.
Systox (E-1059)	organic phosphate	Geary Chemical Corp.
Vancide 51	30% sodium salts dimethyl dithiocarbamic acid & 2-mercaptobenzothiozole	R. T. Vanderbilt Co.
XP-47	dibromobutene	Shell Chemical Corp.
Zerlate	76% ziram	E.I. duPont de Nemours & Co.
1182	4-chloro-3, 5-dimethylphenoxyethanol	Carbide & Carbon Chemical Corp.
1207	2-norcamphanemethanol	Carbide & Carbon Chemical Corp.

NEMATODE CONTROL

At Berkeley, California, M. W. Allen and D. J. Raski applied fumigants 8 inches deep to sandy loam infested with *Pratylenchus* sp. Treatments were made April 17, 1951 and tuberous begonias planted in May. Soil temperature at time of treatment was 56° F. and no surface seal was used except for dragging the surface. Control was based on tuber weights and number of nematodes per gram of root. Treatments listed in order of efficacy are: (1) CBP-55, 40 gal. /A. (2) CBP-55, 20 gal. /A. (3) D-D, 40 gal. /A. (4) D-D, 60 gal. /A. (5) CBP-55, 60 gal. /A.

In a second similar experiment the same investigators applied fumigants 8 inches deep with a chisel type applicator to loam infested with the strawberry root lesion nematode, *Pratylenchus* sp. Treatments were made in January 1951 and strawberry plants set in February. Soil temperature at time of treatment was 50° F. and the soil surface was dragged. Control of the lesion nematode was determined by counts of live nematodes in soil and number nematodes per gram of root. Treatments listed in order of control are: (1) D-D, 80 gal. /A. (2) CBP-55, 30 gal. /A. (3) D-D, 40 gal. /A. (4) D-D 20 gal. /A. Highest yields were obtained from CBP-55, 30 gal. /A. with D-D, 80 gal. /A. second.

In tests at Bethel, Delaware, H. W. Crittenden applied chemicals 6 inches deep with hand applicators to sandy loam field plots of 12 by 50 feet. Treatments were made September 22, 1950 and pepper plants (California Wonder) set May 10, 1951. Soil temperature was above 60° F. at time of treatment. No surface seal was used. Treatments listed in order of efficacy are: (1) D-D, 27 gal. /A. (2) Iscobrome D, 36 gal. /A. (3) D-D, 20 gal. /A. (4) Iscobrome D, 26 gal. /A. (5) D-D, 14 gal. /A. (6) Iscobrome D, 16 gal. /A. All treatments were significant at 5% level for root knot nematode control but no treatments were significant as regards yields.

In a second similar experiment, tomato plants (Rutgers) were set as indicator plants in treated field plots. Treatments listed in order of efficacy are: (1) D-D, 27 gal. /A. (2) Iscobrome D, 36 gal. /A. (3) Iscobrome D, 26 gal. /A. (4) D-D, 20 gal. /A. (5) D-D, 14 gal. /A. (6) Iscobrome D, 16 gal. /A. Use of D-D at 20 gal. /A. resulted in highest yields with Iscobrome D, 26 gal. /A. resulting in the lowest yields, exclusive of check plots.

In tests at Gainesville, Florida, Fred Clark applied ethylene dibromide at 7-8 gal. /A. and D-D at 10 gal. /A. 8 inches deep to field and plant beds of Norfolk fine loam for control of root-knot nematodes. CBP-55 at 1 gal. /sq. yd. was applied as emulsion. No data are given on control except that CBP-55 "looks promising as herbicide."

In tests at Beltsville, Maryland, J. N. Sasser applied Systox (E-1059) to 5-inch pots of root-knot infested soil. Three hundred ml. of 0.05 to 0.5% mixtures were applied one week before planting cucumbers. Root systems were examined 31 days after seeding. Root knot was controlled at the 0.1% level. Higher concentrations were phytotoxic. Laboratory studies indicated that control was due to inhibition of hatching of larvae from egg masses and death to larvae after exposure for several days. Nematodes were not killed by feeding on plants which had absorbed chemical from treated sterile soil.

In other tests at Beltsville, Maryland, B. F. Lownsbery treated 6-inch pots of sandy clay containing a mixture of *Rhiziditis*, *Criconeimoides*, *Tylenchorhynchus*, *Helicotylenchus*, *Pratylenchus*, *Tylenchus*, *Mononchus*, *Aleimus*, and *Dorylaimus*. Three replications of each of the following treatments were made January 23, 1951: OS-1199, 100, 200, and 500 lbs./A.; paraformaldehyde, 500, 1000, 2000 lbs./A.; Mathieson 275, 500, 1000, 2000 lbs./A.; and "Cold Smoke", 500, 1000, 2000 lbs./A. Numbers of living nematodes were counted five weeks after treatment by screening nematodes from 250 cc of soil and counting nematodes in a given aliquot. Only OS-1199 was nematocidal.

In tests at Florence, South Carolina, T. W. Graham treated outside tobacco plant beds on October 13-16, 1950, to control root-knot nematodes and weeds. Tobacco plants were planted in April and May, 1951. Chemicals listed in order of efficacy against root knot nematodes are: (1) Methyl bromide, 1 lb./100 sq. ft. beneath Sisalkraft paper. (2) Uramon-Cyanamid, 1 lb. and 1/2 lb./sq. yd. (3) Allyl alcohol and sodium azide, 6 qt. and 6 lb./100 sq. yd., CBP-55, 10 qt./100 sq. yd. (4) Cyanamide, 100 lbs./100 sq. yd. Highest yields were obtained from the Uramon-Cyanamid and allyl alcohol-sodium azide treatments. Weed control was best on plots treated with Uramon-Cyanamide and CBP-55.

In tests at Norfolk, Virginia, R. S. Mullin conducted two experiments to control root-knot nematodes on sweetpotatoes. In the first experiment, D-D at 2.6 ml./sq. ft. and Dowfume W-85 at 2.6 ml./sq. ft. were injected 6-8 inches deep with hand injectors. Control of cracking of sweetpotato and yields were about equal for the two treatments. In the second experiment, Dowfume W-40 was applied with a power injector at 15-20 gal./A in April and sweetpotatoes planted in May with "no apparent control of cracking."

CONTROL OF FUNGI

In tests in Conejos County, Colorado, N. R. Gerhold and W. J. Henderson applied chemicals at time of seeding green pod peas to control *Fusarium* sp. Chemicals were mixed dry with sand and applied with seed sowed 3 inches deep in fields infested with *Fusarium* sp. Seeds were planted June 1, 1951 and stands determined on August 10. Listed in order of efficacy, treatments are: (1) Dow 9B, 4 lb./A. (2) Phygon XL, 2 lb./A., Dithane Z-78, 2 lb./A., Orthocide 406, 4 lbs./A. (3) Arasan, 3 lbs./A., Ceresan M, 1 lb./A., tribasic copper sulfate, 4 lb./A., tribasic copper sulfate, 8 lb./A. Order of yields were: (1) Dow 9B (2) Orthocide 406, (3) Phygon XL, Dithane Z-78, (4) tribasic copper sulfate, 3 lb., Ceresan M, Arasan, (5) tribasic copper sulfate, 8 lb.

In tests conducted at Greeley and Rocky Ford, Colorado, W. D. Thomas, Jr. and G. H. Lane applied chemicals to onion fields to control *Fusarium* bulb rot on Sweet Spanish onions. All chemicals were applied at time of planting except CBP-55 and Dowfume MC-2 which were applied two weeks before planting. Treatments listed in order of control are: (1) Ceresan M, 2 lb./A. (2) Orthocide 406, 4 lb./A., Goodrite Zac, 4 lb./A. (3) Dowfume W-40, 25 gal./A. (4) Parzate, 4 lb./A. (5) Zerlate, 4 lb./A., Dithane Z-78, 4 lb./A., Arasan, 4 lb./A., CBP-55, 25 lb./A. (6) Phygon XL, 4 lb./A., Dowfume MC-2, 25 lb./A. Treatments with Ceresan M and Dowfume W-40 resulted in the highest yields, with Dowfume MC-2 and CBP-55 in the lowest yields.

In tests conducted at Rocky Ford, Colorado, the same investigators applied chemicals at time of planting, except for CBP-55, to fields to control pink root of onion. Treatments listed in order of disease control are: (1) Dowfume W-40, 25 gal./A., Orthocide 406, 4 lb./A. (2) Goodrite Zac, 4 lb./A. Parzate, 4 lb./A., Dithane Z-78, 4 lb./A. (3) Phygon XL, 4 lbs./A., Arasan, 3 lb./A. (4) CBP-55, 25 lb./A. (5) Ceresan M, 2 lb./A. Highest yields were obtained from treatments with Dithane Z-78, Parzate, and Goodrite Zac. Lowest yields resulted from CBP-55 treatment.

In tests conducted at Brush, Colorado, N. R. Gerhold and J. Twomey applied chemicals to fields at time of seeding sugar beets for control of *Fusarium* seedling blight. Listed in order of disease control, treatments are: (1) Arasan, 4 lb./A. (2) Dow DHA, 4 lb./A. (3) Dithane Z-78, 4 lb./A. (4) Cadminate, 4 lb./A. (5) Orthocide 406, 4 lb./A. (6) Ceresan M, 1 lb./A. (7) Crag 658, 4 lbs./A. (8) Phygon XL, 2 lb./A. (9) Yellow Cuproicide, 4 lb./A. (10) Spergon, 4 lb./A. (11) Parzate, 4 lb./A. (12) Dow 9B, 4 lb./A. Highest yields were obtained from treatments

with Dithane Z-78 and lowest yields from Spergon, with Dow 9B and Arasan next lowest.

In tests at Greeley, Colorado, C. E. Seliskar and W. J. Henderson applied chemicals with Pinto Bean seed to control *Rhizoctonia solani*. The soil was a sandy loam of 68° F. at time of treatment. Treatments listed in order of efficacy are: (1) Dithane Z-78, 4 lb./A., Agrox, 1 lb./A. (2) OS-1199, 2 lb./A., Arasan, 3 lb./A. (3) Phygon XL, 2 lb./A. (4) Spergon, 4 lb./A., Orthocide 406, 4 lb./A. (5) Oxy-Quin, 3 lb./A. (6) Dow 9B, 2 lb./A. (7) P-162, 3 lb./A. Highest yields were obtained from treatments with Agrox and Dithane Z-78. Lowest yields were obtained from P-162. Oxy-Quin, Dow 9B, and P-162 were phytotoxic.

In tests at Sanford, Florida, George Swank, Jr. treated field plant beds of sandy soil at 87° F. to control *Rhizoctonia solani*, *Pythium* sp. and *Fusarium* sp. Treatments were D-D, 3 ml./sq. ft. injected 6 inches deep; chloropicrin, 3 ml./sq. ft., injected 6 inches deep and a water seal applied; methyl bromide, 1 lb./50 sq. ft., applied beneath Sisalkraft paper; dibromobutene powder, 3 gm., dibromobutene emulsion, 5 gm., P-162, 1 ml., Arasan, 3 gm., Mathieson 290, 8 gm., Spergon, 6 gm., SR-406, 6 gm., and Robertson Copper, 5 gm., were all mixed with fine vermiculite and tilled in top 3 to 4 inches. All dosages are per square foot of soil. Chlorobromopropene at 1 qt./100 sq. feet was applied in the same manner. Treatments listed in order of efficacy are: (1) Dowfume MC-2, dibromobutene emulsion. (2) Arasan (3) Dibromobutene powder, chloropicrin. (4) Chlorobromopropene, Spergon. (5) Robertson Copper. (6) P-162, Mathieson 290, D-D. SR-406 was phytotoxic. Arasan, Spergon, and Robertson copper were slightly phytotoxic. Good weed control was obtained with Dowfume MC-2; chloropicrin, and dibromobutene.

In tests at Waltham, Massachusetts, R. W. Ames applied Carbide & Carbon 1182 at 0.735 gm./12.5 gal./100 sq. ft. and No. 1207 at 2.94 gm./12.5 gal./100 sq. ft. to sandy loam, for control of *Fusarium oxysporum* f. *dianthi* on carnations. Pre- and post-planting treatments were made to greenhouse beds by drenching the surface. No. 1207 gave better control although plants were stunted. Treatment with No. 1182 appeared to stimulate growth and increase number of breaks per plant.

In tests at Amherst, Massachusetts, W. L. Doran reports two experiments conducted in the greenhouse where chemicals were applied dry to soil once before seeding. In the first experiment, "there was some control of club root by Mathieson's chemical 275 and by OS-1199 dust". In the second experiment to control damping-off of several vegetables, "there was some control of damping-off by Vancide, by Orthocide and Shell's OS-1199."

In tests at Waltham, Massachusetts, R. W. Ames and E. C. Gasiorkiewicz drenched the surface of sandy loam greenhouse beds to control *Fusarium oxysporum* f. *dianthi* on carnation. Treatments were: F-531, 2 oz./100 sq. ft., Goodrite Zac, 2 oz./100 sq. ft., Dithane Z-78 4 oz./100 sq. ft., Natriphene, 36.5 grains/2.5 gal./100 sq. ft., chlorobromopropene, 1 qt./100 gal., 1/2 gal./sq. yd., XP-47, 10 gm./sq. yd. No data were given on control or yields. Chlorobromopropene was injurious to plants and XP-47 was "highly toxic to plants and handler".

In tests at Knoxville, Tennessee, J. O. Andes applied the following treatments by drenching the top 2 to 3 inches of soil: Tribasic copper sulfate, 20 lb./A., Dithane Z-78, 20 lb./A., calcium cyanamid, 100 lb./A., P-162, 0.2 gm./sq. ft., and DN-111, 0.2 gm./sq. ft. Chemicals were applied to plots previously infested with *Sclerotinia trifoliorum* and crimson clover was planted one month after treatment. "No control obtained by any of the chemicals used." In a second experiment with the same organism and crop, the following chemicals were applied: 341 SC, Dithane D-14, Phygon, Zerlate, tribasic copper sulfate, Parzate, wettable sulfur, Orthocide 406, Cuproicide, Cyanamid, Panogen, Permacide, and P-162. The last 3 chemicals killed the clover. "Fermate at 2 oz./2 gal. water applied as drench to wet the ground arrested the growth and spread of this disease with no injury to the clover."

In tests at Wenatchee, Washington, Roderick Sprague treated field plots for control of *Typhula* sp. on winter wheats. Treatments were applied to the soil surface as drench or damp powder October 24, after planting wheat August 20. The treatments listed in order of control are: (1) Ceresan M, 7 lb./A. (2) Orthocide 406, 14 lb./A. (3) Crag 5379, 14 lb./A. (4) Lime-sulfur, 20 gal./A. (5) Wettable sulfur, 60 lb./A. "Only the Ceresan M showed much promise. It cut loss to about one-third of the checks. Cost is still too high."

